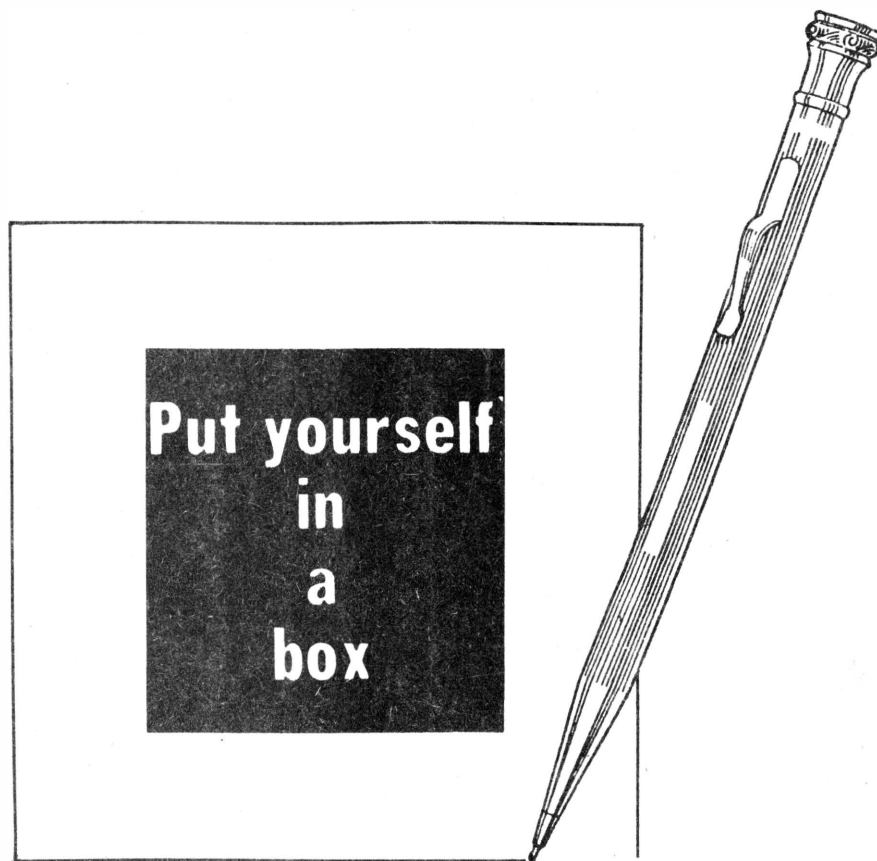

Covering the TI99/4A EXCLUSIVELY!

MICROpendium

Volume 3 Number 10

November 1986

\$1.50 per copy



Demystifying disk controllers—Page 12

A mini-word processor in Forth—Page 22

What was said about the 9640 in Chicago—Page 30

Texas Instruments TI-99/4A — COMPUTERS, COMPONENTS AND SOFTWARE.....

TEX+COMP[™]

America's Number One TI computer retailer
TI-99/4 PRODUCTS AT PROFESSIONAL PRICES

The largest selection of software for the TI-99/4A

Tex Comp continues to stock the world's largest selection of TI Software. The TI Software library on module, disk and cassette was developed from 1979-1983 at a cost of millions and is considered the best in the home computer software field. TI utilized the talents of such industry leaders as Scott Forsman, Milton Bradley, Microsoft Corp., Scott Adams, Addison Wesley Publishing, DLM, Milliken Publishing, Scholastic Inc., Imagic, Spinnaker and the list goes on and on.



MANAGEMENT

INFORMATION MANAGEMENT MODULES

PHM 3006	Home Financial Decisions	4.95
PHM 3007	Household Budget Mgt.	4.95
PHM 3012	Securities Analysis	19.95
PHM 3013	Personal Record Keeping	15.95
PHM 3016	Tax/Inves Rec Keep (Disk Req.)	4.95
PHM 3022	Personal Real Estate	4.95
PHM 3044	Personal Report Generator	10.95
PHM 3035	Terminal Emulator II	9.95
PHM 3111	TI Writer (word processing)	38.75
PHM 3113	Multiplan (spreadsheet)	38.95

DISKETTE PROGRAMS

PHD 5001	Mailing List (PIO Upgrade)	12.95
PHD 5003	Personal Financial Aids	9.95
PHD 5021	Checkbook Manager	9.95
PHD 5022	Finance Manager	19.95
PHD 5024	Inventory Management	19.95
PHD 5027	Invoice Management	19.95
PHD 5029	Cash Management	19.95
PHD 5038	Lease/Purchase Decisions	9.95
PHD 5075	TI Writer/Multiplan Upgrade	9.95

CASSETTE PROGRAMS

PHT 6003	Personal Financial Aids	9.95
PHT 6038	Lease/Purchase Decisions	9.95

EDUCATION

MODULES

PHM 3002	Early Learning Fun	4.95
PHM 3003	Beginning Grammar	4.95
PHM 3004	Number Magic	4.95
PHM 3008	Video Chess	14.95
PHM 3010	Physical Fitness	9.95
PHM 3020	Music Maker	9.95
PHM 3021	Weight Control & Nutrition	10.95
PHM 3064	Touch Typing Tutor	10.95

PHM 3109	TI Logo II (32K req.)	19.95
PHM 3015	Early Reading (Speech)	9.95
PHM 3043	Reading Fun	9.95
PHM 3046	Reading On	9.95
PHM 3047	Reading Roundup	9.95
PHM 3048	Reading Rally	9.95
PHM 3082	Reading Flight	9.95
PHM 3027	Addition & Subtraction I	9.95
PHM 3028	Addition & Subtraction II	9.95
PHM 3029	Multiplication I	9.95
PHM 3049	Division I	9.95
PHM 3050	Numeration I	9.95
PHM 3051	Numeration II	9.95
PHM 3059	Scholastic Spelling 3	9.95
PHM 3080	Scholastic Spelling 4	9.95
PHM 3081	Scholastic Spelling 5	9.95
PHM 3082	Scholastic Spelling 6	9.95
PHM 3088	Computer Math Games VI	9.95
PHM 3090	Milliken Addition	9.95
PHM 3091	Milliken Subtraction	9.95
PHM 3092	Milliken Multiplication	9.95
PHM 3093	Milliken Division	9.95
PHM 3094	Milliken Integers	9.95
PHM 3098	Milliken Number Readness	4.95
PHM 3099	Milliken Laws of Arithmetic	4.95
PHM 3100	Milliken Equations	4.95
PHM 3101	Milliken Meas of Formulas	4.95
PHM 3114	Alligator Mix	6.95
PHM 3115	Allen Addition	6.95
PHM 3117	Dragon Mix	6.95
PHM 3118	Minus Mission	6.95
PHM 3119	Meteor Multiplication	6.95
PHM 3177	Face Maker	9.95
PHM 3178	Story Machine	9.95

DISKETTE PROGRAMS

PHD 5009	Music Skills Trainer	9.95
PHD 5018	Market Simulation	9.95
PHD 5030	Speak & Spell (Speech Ed Req.)	9.95
PHD 5031	Speak & Math (TE II Req.)	9.95
PHD 5042	Spell Writer (TE II Req.)	9.95
PHD 5028	Bridge Bidding I	9.95
PHD 5039	Bridge Bidding II	9.95
PHD 5041	Bridge Bidding III	9.95
PHD 5020	Music Maker Demo (Module Req.)	9.95

CASSETTE PROGRAMS

See disk versions for requirements i.e. TEII

PHT 6009	Music Skills Trainer	8.95
PHT 6011	Computer Music Box	8.95
PHT 6018	Market Simulation	8.95
PHT 6031	Speak & Math	8.95
PHT 6042	Spell Writer	8.95
PHT 6026	Bridge Bidding I	8.95
PHT 6039	Bridge Bidding II	8.95
PHT 6041	Bridge Bidding III	8.95

BRIGHT BEGINNINGS SERIES

PHM 3154	Terry Turtle's Adventure (MBX Expansion System Required)	9.95
PHM 3155	I'm Hiding (MBX Expansion System Required)	9.95

ARCADE PLUS SERIES

PHM 3149	Space Bandit (MBX Expansion System Recommended)	9.95
PHM 3150	Sewermania (MBX Expansion System Recommended)	9.95
PHM 3151	Bigfoot (MBX Expansion System Recommended)	9.95
PHM 3152	Meteor Belt (MBX Expansion System Recommended)	9.95

HOME ENTERTAINMENT

MODULES

PHM 3009	Football	9.95
PHM 3018	Video Games I	4.95
PHM 3023	Hunt the Wumpus	4.95
PHM 3024	Indoor Soccer	8.95
PHM 3025	Mind Challengers	10.95
PHM 3030	Amazing	4.95
PHM 3052	Tombstone City	4.95
PHM 3053	TI Invaders	4.95
PHM 3054	Car Wars	4.95
PHM 3057	Munch Man	4.95
PHM 3042T	Tunnels of Doom (with casa.)	6.95
PHM 3042D	Tunnels of Doom (Disk)	6.95
PHM 3058	Alpiner	4.95
PHM 3110	Chisholm Trail	5.95
PHM 3112	Parsec	4.95
PHM 3031	The Attack	4.95
PHM 3032	Blasto	4.95
PHM 3033	Blackjack & Poker	15.95
PHM 3034	Hustle	6.95
PHM 3038	Zero Zap	8.95
PHM 3037	Hangman	6.95
PHM 3038	Connect Four	8.95
PHM 3067	Othello	9.95

SPECIAL OFFER

Brand New Original Black & Silver TI-99/4A console only \$79.95. Runs all third party modules and comes with 1 year TI factory warranty.

*Shipping, handling & insurance on this special offer is \$10.00 (Continental U.S.) to any UPS deliverable address. HA, AL, Canada and APO slightly higher.

SPECIALS

Original TI Joysticks
\$7.95 (pair)

Replacement 99/4A
Keyboards
(plug in connection)
\$7.95

Replacement Console
Power Supply
(external transformer)
\$9.95

Texas Instruments TI-99/4A Home Computer

Tex-Comp purchased TI's inventory of these outstanding titles in order to continue its support of the TI-99/4A user, and also continually acquires inventory from leading retailers and distributors who have discontinued home computer sales.

With its five warehouses and financial resources, Tex-Comp has been able to assure you, the TI-99/4A user continued support.



PHM 3041T	Adventure & Pirate Adv. (Cass.)	8.95
PHM 3041D	Adventure & Pirate Adv. (Disk)	8.95

ADVENTURE SERIES ON CASS OR DISK (SPECIFY)

Adventureland	9.95
Mission Impossible	9.95
Voodoo Castle	9.95
The Count	9.95
Strange Odyssey	9.95
Mystery Fun House	9.95
Pyramid of Doom	9.95
Ghost Town	9.95
Savage Island I & II	9.95
Golden Voyage	9.95
Ironheart Adventure (Not Scott Adams)	9.95

SPECIAL ALL ABOVE ADVENTURES ON DISK OR CASSETTE INCLUDING IRONHEART

Buckaroo Bonzai	19.95
Soccer of Claymorgue Castle	19.95
Spiderman	19.95
Hulk	19.95

SPECIAL ALL FOUR + 2 BONUS ADVENTURES & HINT BOOK

29.95

Specify Disk or Cassette

DISKETTE PROGRAMS

PHD 5002	Ti-Trek (with new TEII Ver.)	9.95
PHD 5010	Mystery Melody	9.95
PHD 5015	Oldies But Goodies I	9.95
PHD 5017	Oldies But Goodies II	9.95
PHD 5025	Sat. Night Bingo (Speech) Ex-Basic	9.95
PHD 5037	Draw Poker (Ex-Basic Req.)	9.95

CASSETTE PROGRAMS

PHT 6002	Ti-Trek TE-II & Speech	9.95
PHT 6010	Mystery Melody	7.95
PHT 6015	Oldies But Goodies I	7.95
PHT 6017	Oldies But Goodies II	7.95
PHT 6026	Sat. Night Bingo (Speech) Ex-Basic	7.95
PHT 6037	Draw Poker (Ex-Basic Req.)	7.95

TI ARCADE STYLE MODULES AND RECENT RELEASES

PHM 3149	Space Bandit (MBX Expansion)	
	System Recommended	9.95
PHM 3150	Sewermania (MBX Expansion)	
	System Recommended	9.95
PHM 3151	Bigfoot (MBX Expansion)	
	System Recommended	9.95
PHM 3152	Meteor Belt (MBX Expansion)	
	System Recommended	9.95
PHM 3220	Microsurgeon	9.95
PHM 3219	Super Demon Attack	9.95
PHM 3224	Moonsweeper	9.95
PHM 3145	SneggIt	5.95
PHM 3229	Hopper	4.95
PHM 3233	Burgertime	9.95
PHM 3194	Jawbreaker II	5.95
PHM 3227	Congo Bongo	15.95
PHM 3168	Treasure Island	11.95
PHM 3189	Return to Pirates Island	11.95
PHM 3226	Buck Rodgers	15.95
PHM 3225	StarTrek	15.95
PHM 3222	Fathom	9.95
PHM 3146	Munchmobile	11.95
PHM 3197	Slymolds	15.95

COMPUTER PROGRAMMING AIDS

MODULES		
PHM 3028	Extended Basic & Manual	49.95
PHM 3055	Editor Assembler	19.95
PHM 3058	Mini Memory (With Writer)	38.95

DISKETTE PROGRAMS

PHD 5007	Teach Yourself 99/4A Basic	9.95
PHD 5019	Teach Yourself Ex-Basic	9.95
PHD 5004	Programming Aids I	9.95
PHD 5005	Programming Aids II	9.95
PHD 5012	Programming Aids III	9.95
PHD 5077	Programming Aids I, II, & III	24.95
PHD 5067	Beginning Basic Tutor	9.95
PHD 5076	Text to Speech (English)	9.95
PHD 5098	Ti Forth (Ed Assem Req.)	19.95
PHD 5078	Ti Forth Demo Disk (Ed Assem)	9.95
PHD 5079	Forth Source Code (2 Disks)	11.95

CASSETTE PROGRAMS

PHT 6006	Programming Aids I	6.95
PHT 6007	Teach Yourself 99/4A Basic	6.95
PHT 6019	Teach Yourself Ex-Basic	8.95
PHT 6067	Beginning Basic Tutor	6.95

MATH AND ENGINEERING

DISKETTE PROGRAMS

PHD 5006	Math Routine Library	9.95
PHD 5008	Electrical Engineering Lib.	9.95
PHD 5013	Graphing Package	9.95
PHD 5016	Structural Engineering Lib.	9.95
PHD 5044	AC Circuit Analysis	9.95

CASSETTE PROGRAMS

PHT 6006	Math Routine Library	8.95
PHT 6008	Electrical Engineering Lib.	8.95
PHT 6013	Graphing Package	8.95
PHT 6016	Structural Engineering Lib.	8.95
PHT 6044	AC Circuit Analysis	8.95

TI-COUNT SMALL BUSINESS SOFTWARE

General Ledger	69.95
Accounts Receivable	69.95
Accounts Payable	69.95
Inventory	69.95
Payroll	69.95
Mail System	39.95

ALL 6 FOR \$349.95

Send for New Tex-Comp catalog & buyer's guide only \$2.00 (comes with \$5 savings certificate)

Drastic Reductions



VISA and MASTERCARD
HOLDERS CALL DIRECT
(818) 366-6631

add 3% for credit card orders

TERMS: All prices F.O.B. Los Angeles. For fastest service use cashiers check or money order. Add 3% shipping and handling (\$3.00 minimum). East of Mississippi 4% (Free shipping on all software orders over \$100.00). Prices and availability subject to change without notice. We reserve the right to limit quantities.

SEND ORDER AND MAKE CHECKS PAYABLE TO

TEX-COMP™
P.O. BOX 33084 - GRANADA HILLS, CA 91344

Texas Instruments



AUTHORIZED DEALER

NOTE: Payment in full must accompany all orders. Credit Card, Company Check or Money Order for immediate shipment. Personal checks require up to 4 weeks to clear. California orders add 6% sales tax.

Contents

MICROpendium

MICROpendium is published 12 times annually in Round Rock, Texas. No material published in the pages of MICROpendium may be used without permission of the publisher. Computer user groups that have signed exchange agreements with MICROpendium may excerpt articles appearing in MICROpendium without prior approval.

While all efforts are directed at providing factual and true information in published articles, the publisher cannot accept responsibility for errors that appear in advertising or text appearing in MICROpendium. The inclusion of brand names in text does not constitute an endorsement of any product by the publisher. Statements published in MICROpendium which reflect erroneously on individuals, products or companies will be corrected upon contacting the publisher.

Unless the author specifies, letters will be treated as unconditionally assigned for publication, copyright purposes and use in any other publication or brochure and are subject to MICROpendium's unrestricted right to edit and comment.

Display advertising deadlines and rates are available upon request.

All correspondence should be mailed to MICROpendium at P.O. Box 1343, Round Rock, TX 78680. We cannot take responsibility for unsolicited manuscripts but will give consideration to anything sent to the above address. Manuscripts will be returned only if a self-enclosed, stamped envelope is included.

All editions of MICROpendium are mailed from the Round Rock (Texas) or Smithville (Texas) Post Office.

Mailing address: P.O. Box 1343, Round Rock, TX 78680

Telephone: (512) 255-1512

Source: TI4596

John Koloen.....Publisher

Laura Burns.....Editor

Mack McCormick....Technical Editor

Coming next month

- Review of Rave 99 keyboard
- Things you can do with chips, by Mack McCormick
- Three-dimensional tic-tac-toe

Table of Contents

Getting at your disk controller's guts

Mack McCormick provides insights into the mysteries of disk and file access.....Page 12

Forthrite

A mini-word processor in Forth lacks bells and whistles, but is simple, easy and quick.....Page 22

Universal GPL Loader

John Clulow on Paolo Bagneresi's loader for any GRAM simulating device.....Page 26

At the Faire

The biggest event of an eventful day is Lou Phillips' demonstration of Myarc's new computer.....Page 30

Draw and move a square

The CAD series continues, telling you how.....Page 38

Reviews

Submarine Commander.....Page 44

PEP.....Page 45

MAX-RLE.....Page 46

Newsbytes

TI fairs on the east coast, BasicSort's new distribution method, and Graphx upgrades from Tex-Comp.....Page 48

User Notes

Making Mini-Memory tape copies, a "fix" for Fast-Term and another Word Count.....Page 50

Classified.....Page 54

Sensational Prices!!! ... On Our Most Popular Hardware and Software!!

TOP QUALITY PERIPHERALS

from

Mechatronic • CorComp • Myarc MECHATRONIC

TI Intern. This book contains a line by line listing of the TI 99/4A ROM and GROM chips with commentary.

41510 Book \$17.95

Extended BASIC II Plus. This Extended BASIC includes built-in extended statement set and graphics mode. Graphic functions require 32K.

41488 Cartridge \$79.95

TI Mouse w/TI-DOS. Requires Extended BASIC, disk system, 32K.

41493 Mouse with DOS Disk \$119.95

80-Column Card. Full 80 columns on your TI screen!

41505 \$219.95

CORCOMP

Triple Tech. Board for PE Box includes clock/calendar, printer buffer, and speech synthesizer connection.

34643 \$129.00

34639 Clock/Calendar. Stand-alone. \$79.95

34396 9900 32K Micro Memory. Stand-alone 32K. \$99.95

The Memory Plus series

41070 255K Memory Plus Stand-Alone. \$219.00

41633 512K Memory Plus Stand-Alone. \$279.00

41051 256K Memory Plus Card. \$189.00

41065 512K Memory Plus Card. \$239.00

See "Best Selling Hardware" for more CorComp products.

MYARC

34324 256K Card. \$199.00

42245 512K Card. \$249.00

38179 Extended BASIC Level IV. \$69.95

38395 256K Card with Extended BASIC Level IV. \$249.00

42231 512K Card with Extended BASIC Level IV. \$299.00

38198 512K Upgrade Kit for the 128K Card. \$109.95

See "Best Selling Hardware" for more Myarc products.

THE 49¢ microdiskette!



Are you paying too much for diskettes? Try our first quality, prime, 5 1/4" diskettes (no rejects, no seconds) at these fantastic sale prices and save, save, SAVE! Disks are packaged in boxes of 50; each box contains 5 shrink-wrapped 10-packs that include diskettes in sleeves, labels, and write-protect tabs.

Each diskette is certified to be 100% error free and comes with a lifetime warranty (if you have a problem, we'll replace the diskette). All diskettes include hub reinforcement rings and write-protect notch.

Box of 50

32391 SS, DD Diskettes \$24.50
(49¢ each!)

32403 DS, DD Diskettes \$29.50
(59¢ each!)

★★★★★★★★★★★★★★★★★★★★



FREE!
"EVERYTHING BOOK"
For the
TI Home Computer
Order Item #25982

★★★★★★★★★★★★★★★★★★★★

AVAILABLE FROM
YOUR FRIENDS AT

TENEX
Computer
Express
T.M.

We gladly accept
mail orders!

P.O. Box 6578
South Bend, IN 46660

Questions? Call
219/259-7051

NEW
LOW
PRICE!



MicroPal® Extended BASIC

MicroPal's Extended BASIC package now includes two free software programs! Bestsellers *Typewriter* and *Name-It* from Extended Software are included in disk and cassette versions with complete manual — absolutely free!! You can immediately begin using the power of Extended BASIC for word processing and data base functions.



MicroPal Extended BASIC is unconditionally guaranteed to be 100% compatible with all programs written in TI Extended BASIC. With this powerful, high-level language, programmers can have automatic access to the 32K memory expansion, utilize sprite graphics for smooth motion and animation, auto-load disk based programs, and add speech with a 400 word built-in vocabulary! Package includes Extended BASIC on a convenient plug-in cartridge with 240 page manual. Sug. Retail \$89.95

32967

ONLY \$49.95!!

LOST
HITS



"REDISCOVERED"

Some of you may remember that Thorn EMI, the British entertainment giant, developed three super games for the TI. Just before the games were released, TI pulled the plug on the 99/4A and Thorn decided to drop the introductions. At last, TENEX brings you these "lost hits" by special arrangement with a U.K. firm who convinced Thorn to make the program rights available. All three programs are packaged on one convenient disk!

The disk includes:

Computer War

Based on the hit movie "War Games."

Submarine Commander

One of the best submarine simulations ever created for a home computer!

River Rescue

High speed action as you save a group of helpless refugees.

Requires 32K and Extended BASIC.

40856 Disk

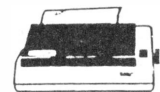
ONLY \$29.95

BEST-SELLING HARDWARE!

STAR MICRONICS NX-10 PRINTER

41366 \$CALL

Latest model! Draft quality at 120 cps, near letter quality at 30 cps. 5K print buffer.



42250 PARALLEL PRINTER INTERFACE \$ 44.95

29784 CORCOMP RS-232 INTERFACE \$127.00

29802 CORCOMP 9900

MICRO-EXPANSION SYSTEM \$329.00

MYARC or CORCOMP RS-232 CARD \$ 79.95

32972 MYARC DISK CONTROLLER CARD \$169.95

29770 CORCOMP DISK

CONTROLLER CARD SALE! \$149.95

13315 CORCOMP 32K MEMORY CARD \$119.95

20164 BOX WITH POWER SUPPLY

for external disk drive \$ 59.95

31173 WICO 3-WAY

GATELOCK JOYSTICK \$ 24.95

10285 TI JOYSTICK ADAPTER \$ 4.95

42442 TAC 5" JOYSTICK. Requires TI Adapter \$ 14.95

42086 SLIK STICK™ JOYSTICK. Requires TI Adapter \$ 6.95

13329 NAVARONE CARTRIDGE EXPANDER \$ 24.95



SHIPPING CHARGES

ORDER AMOUNT	CHARGE
less than \$20.00	\$3.75
\$20.00-\$39.99	4.75
\$40.00-\$74.99	5.75
\$75.00-\$149.99	6.75
\$150.00-\$299.99	7.75
\$300 & up	8.75

Foreign Orders add \$4.00.
Heavy items ship at actual cost.

Ad
M5A

NO EXTRA FEE FOR CHARGES



We verify charge card addresses

ORDER TOLL FREE
1-800-348-2778
INDIANA 1-800-225-6838

Comments

User group listing proposed

I'm afraid that my report on the third annual Chicago TI Faire, sponsored by the 600-member Chicago TI User Group, doesn't say much about the Faire, concentrating as it does on Lou Phillips and his 9640 computer (the 9 stands for the TI99/4A and the 640 is for 640 kilobytes of RAM). And it's not that nothing else happened there. There was a lot going on, ranging from a computer-cello performance by J. Peter Hoddie to a discussion among user group leaders on how to keep their groups viable. And let's not forget the scores of vendors on the exhibition floor, selling everything from cassette recorder cables to the latest, hot off the presses software. (Hoddie finished the final code for two new programs, GRAM Packer and Font Writer, several days before the Faire got under way. And it was a good thing, too, since the two new programs seemed to be selling like hotcakes.)

The article about the 9640 sort of grew out of my notes and when I finally finished it I still hadn't squeezed in everything, all the emerging facts about this wondrous new machine. There will be time and space for the rest of that in the future when the machine finally rolls off the production line. But there is one thing that I didn't get into the article that should be noted. After Phillips had finished his presentation, which ran longer than scheduled, a member of the Ottawa TI99/4A Users Group approached the front of the meeting hall bearing a handmade plaque made by a TI user group in North Bay. The inscription read: "Presented to Lou Phillips and Myarc by the Ottawa TI99/4A Users Group for TI users worldwide." This was followed by a burst of applause and this response from Phillips: "Many times I've asked what am I doing here...and it's mainly you folks and those who appreciate these things that we do that really touches me."

Phillips deserves the accolades as one of the driving forces behind the 99/4A marketplace.

Returning to user groups, Dave Wakely chaired the user group discussion in Chicago and emphasized that a few active members can make any user group a success but to really get things going a group has to actively seek new members. Advertising in local newspapers, posting notices in public places, obtaining a mailing list from Texas Instruments of 99/4A users in particular areas are among the recommendations for building membership. Although we are not involved directly in user group activities, we can provide a service that may help our thousands of non-affiliated members get in touch with other TI users. What we'd like to do is provide a listing of user groups to be included in our January or February edition, with regular updates in the future, much as we have been updating our Freeware list. To keep things standardized, we'd like every user group within reading distance to fill out and return the form below as soon as possible.

EXTENDED BASIC VERSION 2.11

The latest update to Myarc's Extended BASIC II seems to have exterminated the bugs contained in earlier versions. I've been running a lot of Extended BASIC software with it without crashing, something that I couldn't do with earlier versions. Although I haven't been running it very long, I'm already getting accustomed to the speed with which programs such as the TI-Count package run. (TI Count wouldn't run under earlier versions because of its reliance on DEF statements.) I'm not sure whether there is much of a difference on I/O operations, but I have measured significant speed increases in the running of all Extended BASIC programs. When I enter RUN, the program starts RUNNING immediately, not after a delay of several seconds. This holds true for even the simplest disk catalog program in BASIC. I haven't had the time to exploit its enhanced graphics commands and other features, though the demo that comes with it is very impressive in highlighting the capabilities of version 2.11. Purchasers of Myarc's Extended BASIC who have yet to receive a 2.11 update disk should contact the company.

FEEDBACK ON FORTH

We've been running articles about Forth fairly regularly but we're not sure if that's what Forth programmers want. We're curious about reader preferences: Would it be better to run a monthly Forth column, a Forth tutorial series or continue as we have been with single subject articles. We'd appreciate your thoughts on this.

ASSEMBLY FLIGHT SIMULATION

A last minute addition to this month's Newsbytes is an item from Not-Polyoptics about its Spad Flight Simulator. The program is expected to be on the market in January. See Page 50 for details.

LOOKING FORWARD

Any woman with six children deserves a break once in a while, but we reiterate that we can hardly wait until C. Regena (Cheryl Whitelaw) begins with us as a columnist in our January issue. Judging from the notes enclosed with subscription renewals, etc., the anticipation is shared by numerous readers.

—JK

Group Name	_____
Contact Person	_____ Phone No. _____
Mailing Address	_____
Meeting Dates	_____ Place _____
Date Formed	_____ Annual Dues _____
Other Fees, If Any	_____

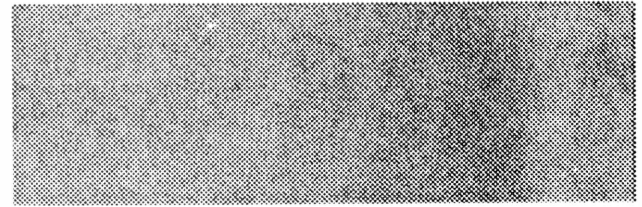
Asgard Software

is proud to present a piece of the future:

The first two commercial programs written in c99 for the 99/4A — The fastest language for the 99/4A outside of assembly!

High Gravity

- Is **High Gravity** an educational game or a game program that's educational? Who knows which, and it really doesn't matter considering that this incredible simulation written in c99 (a language faster than Forth and easier to use than BASIC) is one of the best programs ever written for the 99/4A in any language!
- **High Gravity**, by Tom Wible (a professional programmer), puts you in command of a relief spacecraft sent to aid a space station trapped in a strange solar system. The planets in the system are thick as flies, and prevent anyone from leaving or entering the solar system to rescue the unfortunate people in the space station. Your mission is to shoot a capsule of supplies to the stranded astronauts, and you only have ten capsules of supplies on hand. Worse yet, you can't guide the capsules through since they have no engines. Fantastic graphics make this game colorful as well as exciting.
- **High Gravity** is also an extremely accurate simulation of the Laws of Gravity and the motion of projectiles. The fact that this program is a sophisticated lesson on physics is not apparent — it's a really fun game that gives hours of enjoyment to children AND adults. However, for the educational user all variables of the program may be pre-set; including the initial velocity, the density, size, and spacing of the planets, and much more. **High Gravity** will even let you save and load interesting flight paths of projectiles for later study — a library of such paths is included with the program.
- In short, **High Gravity** is a sophisticated simulation of space flight that is both entertaining and educational. It is an ideal teacher for the physics student (of all levels), and an ideal game for all ages.



It is simple to use and fully documented. It requires the Editor/Assembler module, 32 K and a disk system. Available for only \$14.95.

Total Filer

- Do you have disks and disks full of TI-Writer text files cluttering up your disk library? Do you often catalog one of your TI-Writer disks and find files that you didn't know you had, or even know what they are? Well then, we would like to introduce to you the greatest tool for user's of TI-Writer since the spelling checker; the first and only database designed for text — **Total Filer** by Warren Agee.
- Some database programs say they will let you organize anything, but nothing matches the speed, power and flexibility of a program exclusively designed to let you organize text when it comes to organizing your TI-Writer files. **Total Filer** is a very easy-to-use solution for a complex problem. It is written in c99, an incredibly fast language for the 99/4A, and was designed specifically for handling text.
- With **Total Filer** you can easily create a file-by-file reference of all your text files. Your index can include multiple keyword references for quick searches, as well as several layers of keywords for in-depth descriptions. For searching, **Total Filer** even includes utilities for creating a master listing of the index, as well as letting you compress it to save space on your data disks. **Total Filer** is truly a tool for the "power user."
- **Total Filer** is also very flexible, allowing users to do everything from configure the program for any hardware combination to setting the names of the prompts for different functions. **Total Filer** is the penultimate tool for organizing text of any sort, from magazine articles to computer files, yet it is easy to use and fully documented. It requires the Editor/Assembler module, 32K and a disk system. Available for only \$24.95.

Asgard Software

P.O. Box 10306

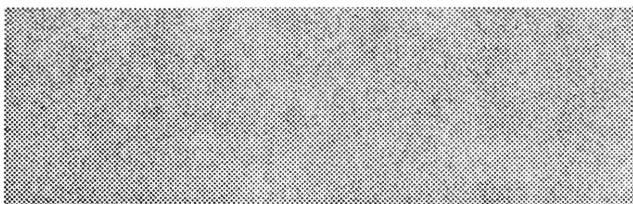
©1986 by Asgard Software

Rockville, MD 20850

(301) 345-2492

"Serving the TI Community"

Note: c99 compiler for the 99/4A by Clint Pulley



Feedback

TI-Artist preferred

I read your article comparing GRAPHX and TI-Artist (August 1986) with interest. I have TI-Artist and have used GRAPHX and I agree with most of the things that Mr. Bobbitt has to say.

However, I don't necessarily agree with his conclusions. I prefer working with TI-Artist because it is so much faster going from one function to another. Waiting for and selecting from the menu seems to take forever with GRAPHX!

Mr. Bobbitt made one mistake in his review that I must correct. He stated that one big disadvantage of TI-Artist is that it has no cursor speed control. It does have such a feature. The speed of the cursor can be changed by pressing FCTN—, (comma). It is practically essential to have such an option when working in the Zoom mode. Perhaps he did not know this because the instructions are rather obscure in some areas.

In the same issue with this article was a notice that there is a new version of TI-Artist available. I hope that it will correct some of the limitations of Version 2.

By the way, is there a bridge-playing program available for the TI?

Judy North
Newport News, Virginia

Bridge Bidding programs manufactured by TI are available from some dealers.—Ed.

Where to get PEBs

Please pass the following information along to Bryan D. Turner who was asking about where to buy PEBs (Feedback, October '86).

Our group (Mid-South 99 User Group) received a flyer from a place called "The Captains Wheel," TI99/4A Specialists, 17295 Chippendale Ave., Farmington MN 55024, phone number (612) 460-6348 telling about a three-slot expansion kit for \$35 (plus shipping and an added \$10 if you wish to power a disk drive off the same

power supply) with which you assemble the box yourself. If you are looking for a low-priced PEB and know a little about electronics that might be worth looking into.

Also, I read in the September HV 99ers newsletter of Australia that they are embarking on a group project to build their own three-slot PEB themselves. You might want to contact their secretary to see how they are building their PEBs. Their address is HV 99ers, 6 Arcot Close, Tarro, N.S.W. 2322 Australia.

Then one last place to look is in the local paper, as I occasionally see someone with a system for sale in the local want ads.

Gary Cox
Memphis, Tennessee

Finding PE box

I recently received a catalog from RYTE Data which contained information that may provide an answer for Bryan D. Turner of Great Bend, Kansas ("Make a P.E. box!" Feedback, Oct. '86).

In the RYTE Data catalog, the "99AT expansion system" was described as follows:

—lower cost expansion system with more features than any other system;

—up to four disk drives in the system;

—five expansion slots for standard TI size cards;

—smaller connector cable;

—contemporary design and future upgrade;

—support for the Myarc "Geneve" 9640 computer system.

As this project is just now being completed, we are taking advance orders. The 99AT project was designed by Pat Saturn and implemented through Millennium Computers. For full expansion capability; new peripheral cards, disk drives and the new Myarc computer system...the 99AT expansion unit is the only expansion choice. To order yours, simply send us your advance order with your phone number. Your "99AT Expan-

sion Unit" will be ONLY \$210.00 Canadian funds or \$155.00 U.S. funds.

The catalog showed a drawing of the system with space for four half-height drives (in the horizontal position) in an attractive, modern enclosure.

For more information, interested persons should write to RYTE Data/Millennium Computers, 210 Mountain St., Haliburton, Ontario K0M 1S0 (Canada).

Randall L. Griggs
Louisville, Kentucky

Another wish list

1. Eliminate need to name Multiplan disk "TIMP" or allow data files to be loaded from second disk.

2. A home financial manager/stock portfolio program. Does any exist?

3. A way to print Graphx (or other files inverted and shifted so a card can be made (front picture on the lower left corner with text inverse on upper right corner so that card can be folded so picture on the outside opens to text in the inside). Needs to be able to print upside down and on righthand side of page.

Dennis Wood
Bellevue, Washington

Direct connect for acoustic modem?

I own a TI acoustic modem and I would like to know if there is anyone who has tried to bypass the acoustic pickup and make it a direct connect type. Also, does anyone have any suggestions as to whether or not this is even possible?

Keith Onchuck
Chicago, Illinois

We have never used an acoustic modem, so cannot answer you, but welcome comments from readers.—Ed.

Numeric keypad built

I began my numeric keypad project some time ago. I had rounded up a loose keypad, perf board and other

(Please turn to Page 10)



ANNOUNCING MYARC'S 640K RAM

GENEVE t.m.

MODEL 9640 FAMILY COMPUTER

This unit is without a doubt the most sophisticated machine ever offered in the family and small business area to date. With over a year of design and development, including input from more than one hundred users, this machine has surpassed even our own expectations. Take a moment to review some of the many features that place this computer in a class of its own.

★ **99/4(A) COMPATIBLE**
RUNS OVER 100 EXISTING
TI CARTRIDGE PROGRAMS

★ **TI-WRITER NOW A FULL**
80 COLUMNS

★ **99/4(A) COMPATIBLE**
RUNS OVER 95% OF ALL
ASSEMBLY LANGUAGE
PROGRAMS & UTILITIES

★ **MULTIPLAN ALSO 80 COLUMNS**

LARGER
 Standard 640K RAM
 2 MEGABYTES Addressable RAM
 MYARC Memory Card Compatible
 With MYARC 512K Card,
 Supplies 1.1 MEGABYTES RAM
IBM TYPE KEYBOARD Included

FASTER
 At Least 2 - 3 Times

PHONE TYPE CABLE
 Replaces Old Hex Bus Cable

MOUSE SUPPORT

- Separated Function Keys
- Incredible Graphics Capabilities
- Basic 3.0
- Composite Video Output
- RGB Output
- 128K VDP RAM Memory
- 40 Column Display
- 80 Column Display
- Mouse Output Port
- Joystick Port
- Sound Compatible & Expandable
- Speech Included
- Compatible with Existing Peripheral Cards*
 - Disk Controllers* (MYARC, TI, Corcomp)
 - RS232 Cards* (MYARC, TI, Corcomp)
 - MYARC Memory Expansion Cards Add Directly to RAM (modification required)
- True Hardware Utilities
 - Sprites, Fills, Lines, Data Moves
- TI 9995 Processor Chip - 12 MHz
 - 256 Bytes ULTRA High Speed on Chip RAM
 - Pre-fetch on Instructions
 - Post-store on Instructions
- More RAM Memory than any machine in its price class

For further information, contact your nearest dealer.

If unknown, contact MYARC (201) 766-1700 for dealer information.

Feedback

(Continued from Page 8)

parts from a local electronics store and set to work. Unfortunately, I incorporated two pole momentary switches for the cursor keys. My first test revealed that they wouldn't work because half the time I would get only an "E" (or S, D or X).

Tony Johnson's article in your May 1986 issue of MICROpendium saved the day. His excellent tutorial guided me through the parts and process necessary to make the whole thing work.

Rather than build an entire keyboard like Tony, I went with a detachable keypad designed to match the TI console. It's based on a sheet metal frame with plexiglass mounts and face. An aluminum shell tops the whole thing off.

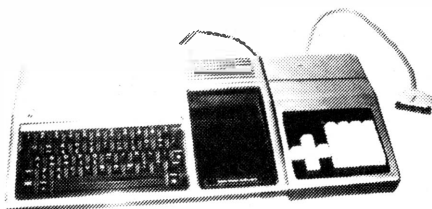
I incorporated an earlier project of mine that allowed me to remote the TI flat I/O cable behind the expansion box. This required a 22/44 card edge connector, 25 pair telephone wire and a homemade male connector. I installed an interrupt switch on the side for screen dumps and a "clear buffer" key for my Triple Tech card.

The keys themselves are wired via a cable with a 15-pin plug. On the computer end, wires were tack soldered on the TI keyboard and terminated at a 15-pin plug mounted at the rear of the console.

Many thanks to Tony Johnson for his concise and thorough tutorial.

Jim Edwards

**Member, San Fernando Valley 99ers
La Crescenta, California**



Program problems

Here's a problem that someone could help me with!

First: I keyed in a program and instead of using "SAVE DSK1.FILENAME" I used SAVE DSK1."FILENAME" and now I can't retrieve it. How come?

Second: I keyed in another program before I had my disk drive and saved it on tape.

I tried to retrieve it into my computer with the disk drive on, but I kept getting "ERROR IN DATA".

And it didn't matter how many times I tried, it still wouldn't take it, even trying different volume and tone levels.

So I tried it again without the disk drive on, with both BASIC and X BASIC and the computer took it!

While the program was in the computer I turned the disk drive on and tried to save it on disk, but when I keyed SAVE DSK1.FILENAME it would lock up so I had to shut down the computer and try again.

After three or four times of retrieving the program without the drive on and turning the drive on, I finally succeeded in getting it on the disk, but I have the same problem; I can't retrieve it!

Third: I keyed in another program, SAVE DSK1.FILENAME.

Now there is nothing on the disk except the "Auto Load" program.

After saving it I went back to the title screen.

I pressed "2" for X BASIC and the "Auto Load" asked what drive I was using and keyed in "1" and gave me the menu: 1. Filename, 2. Load, 3. Exit. I pressed "1" and after I waited a few seconds the screen gave me "Error in line 13" but I don't have a "line 13" in the program!

Well, after listing I found that the program merged with the load program! Double help!

Going back to the programs I can't retrieve: I know they're there. I used the CALL LINK ("Cat") and also TI-Writer and they both show that they do exist.

Can you or anyone explain? Oh, I also used the E/A program and that didn't help either.

**Arthur Dubeau
Woonsocket, Rhode Island**

We'll answer what we can.

As to the use of quotation marks as part of your filename, we have been unable to duplicate the problem in Extended BASIC or BASIC. The quote marks are treated like any other character in this usage.

Lots of users are familiar with the problems associated with loading a program from cassette with a disk drive on. But there's no pat answer.

One explanation starts with the fact that the computer uses some 2K of memory to operate the disk system. Thus, if the program is very long, it won't load in its entirety because there's not enough RAM to hold it. (A cassette recorder won't load into an expansion memory.) Turning the drive off, either by a CALL LOAD or mechanically, frees up this 2K, permitting the entire program to load. (One would think that a "memory full error" would pop up at these times, but that would occur only if the program was actually loaded and RUN. The memory full message would result if all the stack space were used up between the time the RUN command is initiated and the prescan completed.)

Loading the program from disk, with the 2K of memory overhead it requires, would seem to leave less than enough RAM for the program. This is not a comprehensive answer to the cassette-diskette problem, which has many other aspects.

Perhaps the Auto Load program was inadvertently merged with the FILENAME program, or vice versa. Several years ago we were fooling around with an Auto Load program that created its list of programs at startup. It had a habit of merging the selected program into itself. Not knowing which Auto Load program you have, we can't offer any specific advice.

Readers who'd like to go into greater detail on the subject of cassette-diskette transfers and their pitfalls are encouraged to submit an article or User Note.—Ed.

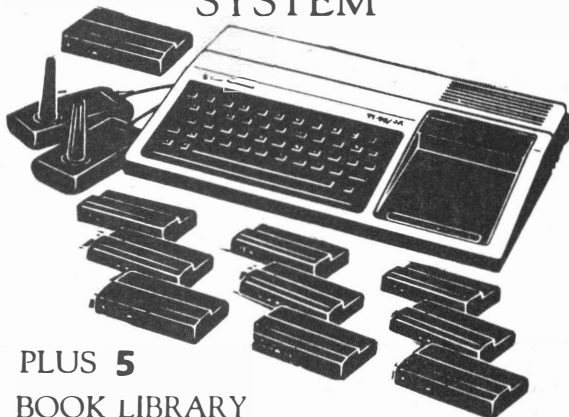
The Feedback column is for readers. It is a forum to communicate with other readers. The editor will condense excessively lengthy submissions where necessary. We ask that writers restrict themselves to one subject for the sake of simplicity. Our only requirement is that items be of interest to persons who use the TI99/4A home computer. Mail Feedback items to: MICROpendium, P.O. Box 1343, Round Rock, TX 78680.

HOLIDAY SALE



AUTHORIZED
DEALER

ON A
COMPLETE COMPUTER
SYSTEM



PLUS 5

BOOK LIBRARY

TO START CHILDREN OF ANY AGE



THE PERFECT
FAMILY
GIFT

TEX+COMP™

AMERICA'S NUMBER ONE
TI COMPUTER RETAILER



Charge-it On Your
Visa or MasterCard
ORDER BY PHONE
24 HOURS A DAY

7 Days a Week!



(818) 366-6631

P.O. Box 33084, Granada Hills, CA 91344

TERMS: All prices F.O.B. Los Angeles. For fastest service send cashiers check or money order. Personal checks require up to 15 days to clear. Prices reflect a 3% discount for cash or approved check. Add 3% for Credit Card orders. Prices and availability are subject to change without notice. We reserve the right to limit quantities. California orders add 6.5% sales tax.

Tex Comp, the world's largest retailer of Texas Instruments home computer products invites you and your family to join the millions of families who are already using the TI-99/4A, the most powerful and versatile home computer ever produced. There are over 1000 programs now available for the TI-99/4A including education, family financing, arcade games, word processing, data base management, and the list goes on and on. New software & accessories are being continuously introduced. Tex-Comp and Texas Instruments have put together this offer to provide your family with the opportunity to get started with a **real quality computer** instead of an underpowered game playing toy.

YOU RECEIVE THE FOLLOWING

1. TI-99/4A Deluxe Black & Silver Computer complete with TV adaptor, power supply, users manual, programming manual and 1 year TI warranty.
2. One pair of TI Joysticks
3. 4-Volume set of Datamost books for the TI-99/4A: Kids & TI, Computer Playground TI, Elementary TI & Games TIs Play
4. Best selling book "Programs for the TI Home Computer" by Davis
5. 10 Most Popular TI Software Modules: Early Learning Fun, Physical Fitness, Amazing, Hangman, TI Invaders, Blasto, Munchman, The Attack, Tombstone City, and Home Financial Decisions
6. Cassette recorder interface cable
7. Tex-Comp TI-99/4A Catalog & Order Kit
8. \$50 Savings Certificate on future orders Purchase up to \$100 from a large selection of TI Software, Accessories and Books at 1/2 the regular price.

ALL FOR ONLY

Your Cost

\$99.95

*Shipping, handling & insurance on this special offer is \$10.00 (Continental U.S.) to any UPS deliverable address, HI, AK, Canada and APO slightly higher.

Complete with a \$50 Savings Certificate for use on future purchases.



Getting at the guts of your TI's disk controller card

By **MACK McCORMICK**
Technical Editor

I think we all find disks and file access to be a mystery. There has been much discussion on disk protection schemes and on what information is contained on a disk. (I might add that I am saddened to see track copy programs floating around. They will surely lead software programmers to devote more energy to hardware projects which aren't so easily compromised.) The intention of this tutorial is to provide insight into the mystery of disks.

This tutorial takes the basic information we have learned and applies it to applications for reading sectors at the disk ROM and direct access to the controller chip level. This tutorial is a bit advanced but if you've been following the previous ones (published periodically in MICROpendium since October 1985) it shouldn't be too difficult.

In reviewing the information I have on the subject I find the entire subject is covered in five books totaling about 2,000 pages. Obviously, I must limit my discussion. I'll break this into several sub-series'.

The disk DSR (device service routine) is developed on three levels:

Level 1—Basic disk functions. Sector Read/Write, head control, drive selections, track formatting and buffer allocation.

Level 2—The "file" concept. Each file is accessible by its name and an offset of a 256-byte block relative to the beginning of the file.

Level 3—Extension to the user level. Fixed or variable length records or files.

One other level which you won't find documented is direct access to the controller chip in the controller card.

(See Page 14)

Sector I/O Routine

```
*****
*
*   SECTOR I/O ROUTINE DEMO USING
*           DSRLNK
*   ACCOMPANIES SECTOR I/O TUTORIAL
*           BY MACK MCCORMICK
*
*****
DEF SECTOR
REF UMBW,UMBR,DSRLNK

PABI DATA >0110      SUBPROGRAM 010
CPUBUF BSS 256        CPU BUFFER

SECTOR LI R0,>F80      ADDRESS OF PAB
        LI R1,PABI     PAB
        LI R2,2        TWO BYTES
        BLWP 2,UMBW     WRITE PAB TO VDP
        LI R1,>0101
        MOV R1,>834C    /DISK DRIVE 1, <>0=READ
        LI R1,>1000
        MOV R1,>834E    /VDP BUFFER START ADDRESS/ AT LEAST 256K
        CLR R1
        MOV R1,>8350    /LOOK AT SECTOR 0
        LI R1,>F80
        MOV R1,>8356    POINT TO THE PAB AT >8356
        BLWP 2,DSRLNK  ACCESS THE DISK
        DATA >A       USE DISK DSR SUBROUTINES (10 BYTES PAST HEADER)
* NORMALLY YOU WOULD CHECK FOR ERRORS AT >8350 HERE
* YOU COULD ALSO CHECK >834A FOR ACTUAL SECTOR READ

*-----*
* PUT IT UP ON THE SCREEN *
*-----*
        LI R0,>1000    VDP BUFFER ADDRESS
        LI R1,CPUBUF  CPU BUFFER ADDRESS
        LI R2,256     MOVE 256 BYTES DOWN
        BLWP 2,UMBR
*THIS WOULD BE THE PLACE TO MANIPULATE DATA BEFORE WRITING IT BACK UP
        CLR R0        SIT POSITION 0
        BLWP 2,UMBW   WRITE UP TO SCREEN IMAGE TABLE
*-----*
* WRITE BACK OUT TO DISK *
*-----*
        LI R1,>0100    /DISK 1, WRITE/
        MOV R1,>834C
        BLWP 2,DSRLNK WRITE IT BACK OUT
        DATA >A
        JMP $         YOU WOULD EXIT THE PROGRAM HERE
        END
* YOU CAN SEE HOW EASY IT IS TO WRITE A SECTOR COPIER JUST FROM THIS SHORT CODE
* ADD A FEW WHISTLES AND BELLS AND YOU HAVE A FIRST CLASS PRODUCT

*****
*
*   2D EXAMPLE
*   SECTOR I/O ROUTINE DEMO USING
*   DIRECT ROM ACCESS
*   ACCOMPANIES SECTOR I/O TUTORIAL
*   BY MACK MCCORMICK
*
*****
```

(See Page 14)

TEX⁺COMPTM

America's Number One TI computer retailer

puts the big names in software on line.



PAC-MAN, CENTIPEDE & DONKEY KONG ARE THE ALL TIME FAVORITE ARCADE GAMES. NOW YOU CAN ENJOY THE EXCITEMENT AND ACTION OF THESE BEST SELLERS RIGHT AT HOME WITH YOUR TI-99/4A. TEX-COMP HAS JUST PURCHASED THE REMAINING INVENTORY OF THESE THREE ARCADE GAME MODULES BY ATARISOFT AT A SPECIAL PRICE AND IS PASSING THE SAVINGS ON TO YOU. DON'T CONFUSE THESE TOP RATED VIDEO ARCADE GAMES WITH THE OTHER ATARISOFT GAMES FOR THE TI-99/4A. THESE ARE THE ABSOLUTE BEST AND THE HARDEST TO GET AS THEY WERE ONLY MADE IN LIMITED QUANTITIES.

It's the best software at the best prices **\$9⁹⁵** each +s&h
BUY 2—GET 1 FREE! **\$19⁹⁵** all three +s&h

Send order and make checks payable to:

TEX⁺COMP

P.O. BOX 33084—GRANADA HILLS, CA 91344



AUTHORIZED DEALER



VISA and MASTERCARD
 HOLDERS CALL DIRECT
(818) 366-6631
 24 Hour Order Line

TEX: All prices F.O.B. Los Angeles. For fastest service use cashiers check or money order. Add 3% shipping and handling (\$3.00 Minimum). East of Mississippi 4 1/2%. Add 3% for Credit Card orders. Prices and availability subject to change without notice. We reserve the right to limit quantities.

NOTE: Payment in full must accompany all orders. Credit card, Company check or Money order for immediate shipment. Personal Checks require up to 4 weeks to clear. California orders add 6 1/2% sales tax.

Send \$2.00 for our new 99/4A 30-page catalog and buyer's guide.

©1986 TEX—COMP

DISK CONTROLLER—

(Continued from Page 12)

I intend to confine my discussion to level 1 and chip level routines. Due to length, this tutorial will focus on sector I/O, followed in subsequent tutorials with formatting, direct file access, and buffer allocation (ie. CALL FILES).

There are three different controller chips contained in the three different controller cards on the market (TI, CorComp, Myarc). The chips are all made by Western Digital. They are the WD 1771, WD 2793 and the WD 1770, respectively. I will limit this tutorial to the TI controller card and its chip. Everything in this tutorial will pertain to all three cards except direct access to the controller chip and its associated commands for the MYARC card. If you own one of these other cards and need additional information let me know, but I will not release proprietary information on the CorComp or Myarc controllers.

First, let's review the TI controller card features and ROM. As you know it can control up to three DS/SD drives. There are 40 tracks per drive and 9 sectors per track. Each sector is 256 bytes in length. Track 0 is closest to the outside and track 39 nearest the center of the disk. There is a built in DSR ROM which contains six level one routines which may be executed by branching to them. These will accomplish almost all we need to do, except such things as track I/O, Volume Information Block update, etc. To get at these routines you must access the Floppy Disk Controller (FDC) chip directly. To accomplish this we need to know how the FDC chip accesses the drive and build from there.

Here are some of the features of the WD 1771 chip: Automatic track seek with verification, in the read/write mode single/multiple sector read/write with automatic sector seek. Writes entire track for formatting. Programmable track to track step times. Six registers:

Data shift register—Assembles serial data from the disk read and transfers during write.

Data Register—8-bit holding register during read/write operations. During a seek command it contains the desired track position.

Track Register—8-bit register that contains the track number of the current read/write head position. Incremented by one as the head steps in toward track 39 and decremented by one towards track 00. Contents are compared with the disk track number

in the ID field during read, write and verify.

Sector Register—8-bit register for holding the desired sector position. Contents compared with the disk sector ID field during read and write operations.

Command Register—8-bit register for the command to be executed.

Status Register—8-bit register to hold drive status.

(See Page 16)

SECTOR I/O ROUTINE—

(Continued from Page 12)

```

DEF  SECTOR
REF  UMBW,UMBR,GPLWS

SUBR  DATA >0110      SUBPROGRAM 010
CPUBUF BSS 256         CPU BUFFER
MYREG  BSS >20         MY WORKSPACE

SECTOR LWPI GPLWS

      LI R1,>0101
      MOV R1,>834C      /DISK DRIVE 1, (>0=READ
      LI R1,>1000
      MOV R1,>834E      /VDP BUFFER START ADDRESS/ AT LEAST 256K
      CLR R1
      MOV R1,>8350      /LOOK AT SECTOR 0
      LI R12,>1100      SET CRU REGISTER TO BASE ADDRESS OF >1100 DSK DSR ROM
      SBO 0             PAGE IN THE DISK DSR ROM TO >4000

* Of course you could eliminate the next five instructions and manually scan the
* DSR ROM for the word which immediately proceeds >0110 and loaded R9 with that
* value which is >56DC in the case of the CorComp card and BL directly to it.
* I scanned the link table so this program could be used with other DSR
* subroutines and with all controller cards.
      LI R9,>4000      BEGINNING OF DISK DSR ROM
NEXT  C *R9+,>SUBR     SEARCH LINK TABLE FOR ENTRY POINT
      JNE NEXT
      AI R9,-4         SUBTRACT 4 FOR ENTRY POINT
      MOV *R9,R9       GET THE ENTRY POINT ADDRESS
      BL *R9           BRANCH TO THE ROUTINE

* NORMALLY YOU WOULD CHECK FOR ERRORS AT >8350 HERE
* YOU COULD ALSO CHECK >834A FOR ACTUAL SECTOR READ

*-----*
* PUT IT UP ON THE SCREEN *
*-----*
      NOP             NOP IS REQUIRED HERE BECAUSE THE DSR ROUTINE INCT'S THE
*                   RT ADDRESS
      LI R0,>1000      VDP BUFFER ADDRESS
      LI R1,CPUBUF     CPU BUFFER ADDRESS
      LI R2,256        MOVE 256 BYTES DOWN
      BLWP >UMBR
*THIS WOULD BE THE PLACE TO MANIPULATE DATA BEFORE WRITING IT BACK UP
      CLR R0           SIT POSITION 0
      BLWP >UMBW       WRITE UP TO SCREEN IMAGE TABLE
*-----*
* WRITE BACK OUT TO DISK *
*-----*
      LI R1,>0100      /DISK 1, WRITE/
      MOV R1,>834C
      BL *R9
      SBZ 0            PAGE OUT DISK DSR
      JMP $            YOU WOULD EXIT THE PROGRAM HERE
      END

```

CHARACTER SETS AND GRAPHIC DESIGN 3

Character Sets and Graphics Design III (CSGD III) offers four new and powerful graphic printing capabilities to the 99/4a user. Now you can easily create letterheads, stationery, labels, and signs with a wide range of unique fonts and small graphics. Plus, using the special Docuprint program, files generated by TI-Writer can be printed in any one of six full graphic character sets.

Letterheads and stationery can be designed for business use and personal correspondence. Each can have that neat and professional look using the top and/or bottom of a page mixing any large and small fonts with small graphics. For convenience, letterheads and stationery can be printed continuously, and saved to disk for later use.

Signs, T-Shirt transfers, and other message oriented items can be easily printed using any of the available fonts and small graphics. A large amount of flexibility has been designed into this message printing feature, thus it has virtually limitless possibilities.

For the first time, documents written using TI-Writer can be printed in any one of six full graphic character sets. No longer will you have to settle for your printers resident character set! When printing a document, you can choose 6 or 8 lines per inch, add page numbers, print multiple file documents, set top and bottom margins, set tabs, and print in two column format. A special typewriter mode will even allow you to print short notes or letters without preparing a TI-Writer file first.

Custom designed labels (like the one shown below) can easily be created for almost any purpose, such as return address labels, or name tags. Using the different fonts, small graphics, and borders, labels can be designed in various sizes up to 1 15/16" high and 5" in length. For convenience, labels can be printed continuously, and saved to disk for later use.

CASLON
BANNER
PCSET2 FAT

CSGD LABEL MAKER
FOR CUSTOM DESIGNS
BORDERS AND GRAPHICS!

FILM
STRIPS
FROZEN

The complete three disk package comes with 25 fonts, 40 small graphics, and thorough documentation, for only \$17.95. CSGD III requires a disk system, 32K memory expansion, TI Extended Basic, and either an Epson or Prowriter graphics compatible printer (specify your printer when ordering).

CSGD SUPPORT LIBRARIES

Since CSGD III is a continuation of the CSGD series, all previous fonts and graphics libraries are compatible with it. Thus, CSGD III is already a fully supported software package. You can order User Disk #1 (7 fonts, 3 graphics) for \$5.95, User Disk #2 (two disks: 12 fonts, 127 graphics) for \$10.95, and User Disk #3 (two disks: 22 fonts, 86 graphics). Please specify printer when ordering.

Texaments
53 Center Street, Patchogue, New York 11772

Please add shipping charges as follows: \$2.00 for software, \$4.00 for hardware. Call our office (516-475-8480) or bulletin board service (516-475-6468) for additional information. All C.O.D. orders must be called in. Sorry no credit card orders accepted. Prices and availability subject to change without notice. Dealer inquiries are invited.

DISK CONTROLLER—

(Continued from Page 14)

There will be much more information on these registers as the tutorials progress.

There are 11 commands available:

Type	Command	Bits						
		7	6	5	4	3	2	1
I	Restore	0	0	0	0	h	V	r1r0
I	Seek	0	0	0	1	h	V	r1r0
I	Step	0	0	1	u	h	V	r1r0
I	Step In	0	1	0	u	h	V	r1r0
I	Step Out	0	1	1	u	h	V	r1r0
II	Read Command	1	0	0	m	b	E	0 0
II	Write Command	1	0	1	m	b	E	ala2
III	Read Address	1	1	0	0	0	E	0 0
III	Read Track	1	1	1	0	0	1	0 s
III	Write Track	1	1	1	1	0	1	0 0
IV	Force Interrupt	1	1	0	1	1	3	121114

Plug in the appropriate values by type command:

Type I

h = Head load flag. 1-beginning. 2-not beginning.

V = Verify. 1-verify on last track. 0-no verify.

r1r0 = Stepping motor rate. 0 0 - 6ms. 1 0 - 10ms. 1 1 - 20ms.

u = Update flag. 1-update track register. 0-no update.

Note: Head step times are based on the 1 MHz clock contained in the controller card.

Type II

m = multiple record. 0-single. 1-multiple.

b = Block length flag. 1-IBM format (256 Byte). Other flags only if need to know.

ala0 = Data Address Mark 00- >FB(Data Mark)

Type III

s = Synchronize Flag. 0-Single density.

Type IV (interrupt condition flags)

I0 = 1, not ready to transition.

I1 = 1, Ready to not ready transition.

I2 = 1, Index Pulse

I3 = 1, Immediate Interrupt

E = Enable head load and 10 msec delay 1-delay. 0-head already loaded no delay.

This may seem confusing now but before it's all over you should have a better understanding of the process.

"Head loading" means the read/write heads are placed in contact with the disk (the click you hear when the drive activates) and data may be transferred. The head stays loaded un-

til a command is received to unload or until timeout occurs (two revolutions of the disk).

I suppose this is the best place to (See Page 18)

Sector Read

```
*****
***                                     ***
*** This program does a sector read ***
*** at the FDC level FD1771.         ***
*** Will only work with TI card as   ***
*** written. Must INV commands to work ***
*** with CorComp. TI card is on an INV ***
*** data bus. CorComp is not.        ***
***                                     ***
*****
DEF SECTOR
```

```
WS EQU >B3E0 LETS USE SOME HIGH SPEED RAM FOR OUR WS
```

```
*****
* FD1771 DEFINITIONS *
* THESE LOCATIONS ARE MEMORY MAPPED *
*****
```

```
FDS EQU >5FF0 READ STATUS
FDR1 EQU >5FF2 READ TRACK REGISTER
FDR0 EQU >5FF6 READ DATA REGISTER
FDC EQU >5FFB COMMAND REGISTER
FDWT EQU >5FFA WRITE TRACK REGISTER
FDWS EQU >5FFC WRITE SECTOR REGISTER
FDWD EQU >5FFE WRITE DATA REGISTER
```

```
*****
* REGISTER DEFINITIONS *
* ANOTHER WAY TO DEFINE WORKSPACE *
* REGISTER DEFINITIONS BY NAME *
*****
```

```
VALUE EQU 0 GENERAL
VALUE1 EQU 1 GENERAL
RAMPNT EQU 2 VDP RAM POINTER
COUNT EQU 6 GENERAL PURPOSE COUNTER
TEMP EQU 7 USED TO STORE RT ADDR
TEMP1 EQU 8 USED TO STORE RT ADDR
CRUBAS EQU 12 CONTAINS CRU ADDRESS
VDP EQU 15 CONTAINS ADDR OF VDPWA
```

```
*****
* CRU DEFINITIONS *
*****
```

```
MOTBIT EQU 1 MOTOR ON BIT OFFSET
WAIBIT EQU 2 WAIT LOGIC ENABLE
HLTBIT EQU 3 HEAD LOAD TIMING BIT
DS1BIT EQU 4 FIRST DRIVE SELECT BIT OFFSET
```

```
*****
* VDP DEFINITIONS *
*****
```

```
VDPWA EQU >8C02 VDP WRITE ADDRESS
VRD EQU >8800-VDPWA READ DATA
VWD EQU >8C00-VDPWA WRITE DATA
VRS EQU >8802-VDPWA STATUS
```

```
*****
* MISC DEFINITIONS *
*****
```

```
T75M EQU 75*40 75 MILLISECONDS
T1000M EQU 40000 ONE SECOND
NSEC EQU 9 # SECTORS PER TRACK
SECLN EQU 256 # BYTES PER SECTOR
MEMSTA EQU 0 VDP LOCATION FOR DATA (SCREEN IMAGE TABLE HERE)
```

(See Page 18)

NEW FROM MONTY SCHMIDT: **GPL LINKER V1.1 RunTime Version**

GPL Linker is an ingenious program that places the power of Graphics Language Programming (GPL) at your command. No extra hardware is required beyond standard 32k and disk system. In short, Linker creates runnable program files from compressed (or uncompressed) GPL Assembler object files. You can then run these programs with "Option 5 Run Program Files" of the Editor Assembler Module.

Up to 24k GPL programs can be developed and run on standard 32k systems. Included in the run time version are two demonstration programs and "CONVERT," a public domain conversion program that converts MS BASIC statements to TI BASIC statements. Price: \$21.00 CDN funds \$15.00 US funds.

now \$49.95
w/Linker \$59.95
plus Intern \$69.95
add \$3 shipping

ENHANCED **GPL Assembler V2.1**

NOW with high memory loader package

UNLOCK ALL THE SECRETS! New GPL Assembler Version 2.1 available exclusively through Ryte Data.

This program provides the power to write, edit and assemble true GPL programs for the TI 99/4A. Create code that accesses console operating system routines directly. Develop programs that use the GPL Interpreter and all the features of the TI 99/4A.

This package includes the GPL Assembler disk, printed documentation, GPL tips and hints, update support service and commented GROM/ROM listings (with the book "INTERN"). An example for a command module type GPL program is included with source, object and list files on disk.

Requires: 32k memory, disk drive(s), TI Editor Assembler package. Printer/RS-232 recommended.

GPL price Reduction

MegaRamtm from **ATRONIC**

The only **full** megabyte (1024k) RAM memory expansion for the 99/4A has now been introduced in North America. This new stand-alone unit attaches to the I/O connector to add the standard 32k PLUS 992k of extra memory. The innovative "SUPERVISOR" program monitors memory use, RAM-DISK functions and bank-switching for application programs. MegaRam works with XB or E/A languages and other TI modules which require 32k. Compatible with virtually all TI programs. MegaRam does not come as an Expansion Box card due to the direct address line access needed.

Price: \$575.95 (US) for twice the memory in this astounding product! Requires console, drive, XB or E/A.



Designed for the CorComp Clock Peripheral—Triple Tech Card or Stand-alone models. This utility package provides more functions for use in your Extended Basic programs. Direct access to the clock ROM at assembly speed gives you these features: three independent timers to set and read; alarm function; two interrupt routines to display time and date on screen with CTRL T—continuously or on your command; all time and date displays are in 12 or 24 hour format using **TEXT**. This program also allows the week, date and time to be set independently rather than all together.

Program disk is not copy protected to allow you full use in your Extended Basic programs. Package includes disk and instructions. Only \$17.95 plus \$2

XBII plus

Totally compatible with TI's XB, this enhanced version gives your programs more power to access your 99/4A. Commands such as MLOAD, MSAVE, VPEEK, VPOKE, GPEEK are superior to most other Basic environments. Various demo programs and new applications using high resolution graphics make this module a "must" for Extended Basic users. Comes complete with a 95 page manual. Requires console and 32k. \$75.00 (US) plus \$2 shipping.

BASIC **Compiler V1.1**

New Basic Compiler that is finally easy to use! Supports virtually all Basic and Extended Basic commands in existing programs. Simply load and compile programs from a menu driven directory on your screen. No extensive re-writing, variable declarations or conversions are required. Compiler produces code-list in one pass containing all variable addresses and jump list. Package includes Extended Basic Loader, Floating Point Loader, Integer Loader, Disk Menu program and DSR program for the Compiler support. This Compiler cannot unravel DEF statements and stops on the END statement—no SUB's allowed. TRACE, BREAK, ON ERROR, CALL LOAD and CALL LINK may produce execution errors. Requires 32k, disk. Price: \$20.00 plus \$2 shipping (US funds).

New catalogue available

Prices listed in U.S. funds.

Ryte Data (705) 457-2774



MILLENNIUM COMPUTERS

210 MOUNTAIN STREET,
HALIBURTON, ONTARIO K0M 1S0
TELEX 06-986766 TOR. ATTN: RYTE DA

DISK CONTROLLER—

(Continued from Page 16)

cover the disk format. Have you ever wondered what's in between the data fields (256 bytes)? Well, here it is. (Stick with this series and we will write a program to directly look at that data with a track read command.)

No. of Bytes	What's There
12	Index Gap. >FF
6	Sync >00
* Sector begins here. Repeat 9 times *	
1	ID Single density >FE
1	Track Address >00->27
1	Side >00
1	Sector Address >00->08
1	Sector Len >01
2	Cycle Redundancy Check >F7
11	Data Separator >FF
6	Sync >00
1	Data Address Mark >FB
256	File Data
2	CRC >F7
* Sector ends here *	
36	Data Separator >FF
240	End of track fill >FF

From this you can see there are 3177 bytes per track but only 2304 are actual data bytes.

So far we've covered the basic background. We will go into greater detail as we proceed.

There are three ways to perform a sector I/O. You may use the DSRLNK, access the disk ROM without DSRLNK, or access the controller chip directly. Let's examine the first two methods.

Sector I/O is commonly referred to as subprogram 010. All arguments for the I/O are passed through the FAC block in CPU RAM (834A). Here's how it maps out:

- >834A-4B (Address of actual sector accessed when complete.)
- >834C Disk Drive 1, 2 or 3.
- >834D Read/Write 0 = write.
0 = read
- >834E-4F VDP Buffer Address (256 byte size)
- >8350-51 Sector number

Error codes returned at 8350 after operation. 0 = no error. 1 = error.

Program 1 is a straightforward (no fancy shortcuts) way to read a sector and write it back out to the disk using

DSRLNK and direct ROM access. It should be documented well enough for you to follow. If you have questions that I have not covered, drop me a line.

The second program example

demonstrates how to access the controller card chip directly without using a DSRLNK. It might come in handy if you ever need to save memory space.

(See Page 20)

SECTOR READ—

(Continued from Page 16)

*** PROGRAM STARTS HERE ***

SECTOR

```
LWPI WS
LI CRUBAS,>1100 CRU BASE ADDRESS
LI VDP,VDPWA VDP WRITE ADDRESS >8C02 IN R15
SBO 0 PAGE IN THE ROM SO WE CAN GET AT THE FDC
```

* SELECT THE DRIVE *

```
LI RAMPNT,>0100 DRIVE 1, >02 DRV #2, >04 DRV #3.
AI CRUBAS,2*DSIBIT SET UP THE CRU ADDRESS FOR THE PROPER LINE
LDCR RAMPNT,3 SELECT THE DRIVE (BYTE ADDR SOURCE OPERAND)
AI CRUBAS,-2*DSIBIT BACK OUT THE OFFSET
LI VALUE,T75M WAIT 75 ms
DRIVE SRC TEMP,4 OK TO ROLL TEMP
SRC TEMP,4 JUST WASTING THE PROPER TIME
DEC VALUE
JNE DRIVE
```

* SEEK SECTOR *

* This routine calculates the track and
* sector numbers from the logical
* sector number and seeks the proper
* track. Drive is restored to track 0.*

*** RESTORE THE DRIVE ***

```
BL @LCMD ISSUE A RESTORE CMD
DATA >F500
* FOR EXAMPLE ON CORCOMP DRIVE THIS CMD INV IS >0A00
BL @BUSY1 WAIT FOR RESTORE TO COMPLETE
SET0 VALUE INVERT 0 BYTE
MOVB VALUE,@F0WT OUTPUT THE CURRENT TRACK NUMBER (TRK 0)
```

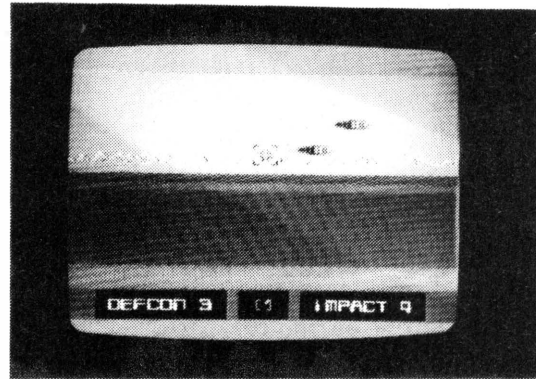
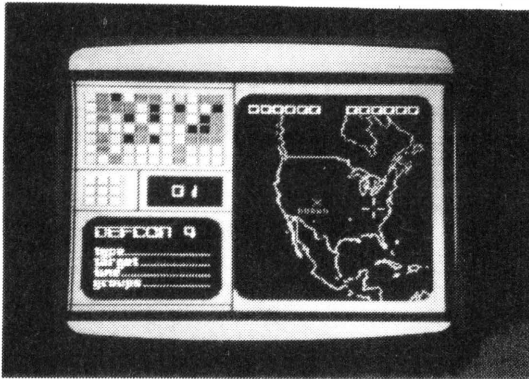
*** COMPUTE THE CORRECT TRACK NUMBER FROM THE LOGICAL SECTOR ***

```
LI VALUE1,0 THE NUMBER HERE IS THE SECTOR YOU WANT TO READ
CLR VALUE DIVIDEND HIGH
LI TEMP,NSEC PUT NUMBER OF SECTORS IN TEMP
DIV TEMP,VALUE
SWPB VALUE QUOTIENT IS TRACK #
INV VALUE INV IT FOR FDC CHIP
MOVB VALUE,@FDWD LOAD FD1771 DATA REGISTER
SWPB VALUE1 REMAINDER IS SECTOR #
INV VALUE1 FDC CHIP LIKES INV VALUES
MOVB VALUE1,@FDWS LOAD FD1771 SECTOR REGISTER
CB VALUE,@FDRT SAME TRACK AS LAST TIME?
JEQ SEEK YUP...GO ON AND DO IT
BL @LCMD SEEK AND VERIFY THE SECTOR ADDRESS
DATA >E100
BL @BUSY1 WAIT FOR COMMAND TO FINISH
```

* NOTE HERE THAT SINCE THE DATA MUST BE MOVED FROM CPU RAM TO VDP RAM HOW MUCH
* TIME TI COULD HAVE SAVED BY GIVING US A CPU WRITE OPTION LIKE MYARC DID.
* INSTEAD IF WE WANT TO USE IT IN CPU WE MUST MOVE IT BACK DOWN WHEN USING THE
* DISK ROM.

*** READ THE SECTOR ***

(See Page 20)

Sensational Prices!!!**... On Our Most Popular
Hardware and Software!!****NEW****COMPUTER WAR**from
MicroPal®**ONLY
\$24.95**

Based on the hit movie "War Games"... this exciting simulation has been a best-seller on diskette — and now it's available from MicroPal® on cartridge! Even if you own just the TI 99/4A console, you can enjoy this new hit. Be prepared for a challenge — as John Koloen at Micropendium observed, "Computer War makes use of multiple screens and is as fast-moving as I can handle."

COMPUTER WAR. The alarm bells are ringing at NORAD! Can you crack the code and destroy the simulated enemy missiles before the world is engulfed in a thermonuclear holocaust?

42480 Sug. Retail \$29.95 **\$24.95**



ORIGINAL TI DUAL JOYSTICKS

Only \$8.95

At this price you should pick up a spare pair!

15499 **\$8.95**

AVAILABLE FROM
YOUR FRIENDS AT

TENEX
Computer
Express
T.M.

*We gladly accept
mail orders!*

P.O. Box 6578
South Bend, IN 46660

**Questions? Call
219/259-7051**

SHIPPING CHARGES

ORDER AMOUNT	CHARGE
less than \$20.00	\$3.75
\$20.00-\$39.99	4.75
\$40.00-\$74.99	5.75
\$75.00-\$149.99	6.75
\$150.00-\$299.99	7.75
\$300 & up	8.75

Foreign Orders add \$4.00.
Heavy items ship at actual cost.

Ad
MSB

NO EXTRA FEE FOR CHARGES

We verify charge card addresses

ORDER TOLL FREE
1-800-348-2778
INDIANA 1-800-225-6838

DISK CONTROLLER—

(Continued from Page 18)

Note that we load R12 with 1100 which is the Communication Register Unit (CRU) address for the disk controller card and then set bit on 0. R12 always contains the CRU base address. A SBO 0 instruction turns on the DSR ROM at memory address >4000->5FFF. The SBZ 0 instruction turns off the DSR ROM later in the program.

I recommend you take your DEBUG program and manually examine the first part of the DSR ROM. After loading DEBUG enter C 1100,1 then enter 1. Look at the memory using M 4000,40FF. You will see all of the level 1 routines we will discuss including the sector I/O (0110) routine. To page the ROM back out enter C 1100,1 and 0. The light should go out on the controller card.

Program three gets down to the nitty gritty and accesses the registers in the controller chip directly. The FD 1771 registers are memory mapped (similar to VDP access). I've tried to document the program sufficiently to explain it. Please write if you have questions.

Until next time, Assembler Executing!

Readers may write Mack at HHC, 1ST INF DIV(FWD), APO NY 09137.—Ed.

CHECKBOOK DATABASE

For ALL Checking Accounts. Control Spending. Keep Accurate Tax Records. Balance Checkbook.

* MINIMUM KEYSTROKE Data Input.

* LIST and TOTAL CHECKS:

- For a specified PAYEE NAME
- For a DATE Range (from/to)
- For a CHECK NUMBER Range (from/to)
- If TAX DEDUCTIBLE
- Any Combination of the above

* LIST and TOTAL Deposits, Interest, and Bank Charges for a DATE Range.

TAPE version requires Mini Memory. Allows 400 Checks and 53 Deposits per year.

DISK version requires X Basic and 32K. Printer optional. 700 Checks and 84 Deposits per year.

Send \$12.95 for TAPE, or \$14.95 for DISK to:

FINE LINE SOFTWARE

3 Wendy Lane, Marlboro, N. J. 07746

SECTOR READ—

(Continued from Page 18)

```
SEEK  LI  RAMPNT, MEMSTA  MEMSTA IS VDP RAM LOCATION TO WRITE TO
      BL  2VDPLAW  PREPARE FOR VDP WRITE

      BL  2LCMD  FINALLY WE CAN READ THE SECTOR
      DATA >7300  REMEMBER THIS IS INV
      SBO  WAIBIT  ENABLE WAIT LOGIC
      LI  COUNT, SECTEN  BYTES PER SECTOR
RSECT  MOVB 2FDRD, VALUE  GET THE BYTE
      INV VALUE  IT WAS INVERTED SO REINVERT IT.
      MOVB VALUE, 2VWD(VDP) PUT IT IN VDP
      MOVB 2FDRD, VALUE  THESE INST ARE REPEATED BECAUSE SPEED IS CRITICAL
      INV VALUE
      MOVB VALUE, 2VWD(VDP)
      DECT COUNT  WE'VE WRITTEN TWO BYTES
      JNE RSECT  FINISHED?
      BL  2BUSY  DISABLE WAIT LOGIC AND WAIT FOR MOTOR TIME OUT

      SBZ 0  PAGE OUT THE ROM
      LIM 2  ENABLE INTERRUPTS
      JMP $  THATS IT FOLKS. FCTN QUIT TO EXIT.
```

```
*****
*SUBROUTINE-TURN MOTOR ON & ISSUE CMD *
* INPUT: CMD IN MSB OF DATA *
* NOTE: ALL COMMANDS MUST BE INV *
*****
LCMD  MOV  *R11+, VALUE  PICK UP COMMAND BYTE
      SBZ MOTBIT  TOGGLE MOTOR ON CLOCK
      SBO MOTBIT
      LI  COUNT, T1000M  ONE SEC TIME OUT
MOTOR  SRC  TEMP, 4  WASTE TIME
      SRC  TEMP, 4
      DEC COUNT
      JNE MOTOR

      MOVB VALUE, 2FDC  LOAD THE COMMAND
      SBO HLTBIT  SET HLT
      SRC  TEMP, 8  WASTE MORE TIME (MOTORS ARE SLOW-
      SRC  TEMP, 8  COMPUTERS ARE FAST (grin))
      RT
```

```
*****
* BUSY ROUTINE *
* Waits for the current command to be *
* completed. No error on motor time out *
*****
BUSY  SBZ WAIBIT  DISABLE WAIT LOGIC
```

```
BUSY1  MOVB 2FDS, VALUE  GET THE STATUS OF THE DRIVE
      INV VALUE  INVERT FOR DATABUS LOGIC
*      JLT NODISK  THIS IS WHERE YOU CHECK FOR NO DISK
      SRC  VALUE, 9  CONTINUE WAIT LOOP?
      JOC BUSY1  YUP...BEEN A CARRY
      RT
```

```
*****
* VDP READ/WRITE SET UP ROUTINE *
* Address in vdp is RAMPNT *
*****
VDPLAW ORI RAMPNT, >4000 SET WRITE BIT
      ANDI RAMPNT, >7FFF STRIP MSB
      JMP VDPLA1
```

```
VDPLAR ANDI RAMPNT, >3FFF STRIP OFF 2 MSB
VDPLA1 SWPB RAMPNT  ALWAYS WRITE LSB FIRST
      MOVB RAMPNT, *VDP  LOAD TO VDP
      SWPB RAMPNT
      MOVB RAMPNT, *VDP  NOW WRITE THE MSB
      ANDI RAMPNT, >3FFF GET RID OF WRITE BIT
      RT
NINE  DATA 9
      END
```


**9900 + FOR THE TI99/4A
THE ULTIMATE
99/4A EXPANSION SYSTEM
AT A SPECIAL
INTRODUCTORY PRICE
FROM TEX⁺COMP™**

TEX-COMP, the undisputed leader in supplying the 99/4A User, has now put together the finest and most complete expansion system ever offered for the TI99/4A.

- **9900 Expansion Box & Regulated Power Supply (UL Approved)**
- **32K Memory Upgrade** Adds 32K bytes of Random Access Memory to your system.
- **Double Sided/Double Density Disk Controller** (operates up to 4 drives)
- **RS232 Interface** Lets you add a wide range of other accessories, such as printers or telephone modems, one parallel and 2 serial outputs.
- **1 SS/SD Disk Drive** Allows you to store and retrieve data on 5 1/4-inch single-or double-sided floppy diskettes.
- **1 Disk Drive Case & Regulated Power Supply**
Handles two 1/2-height drives easily (UL or LAC Approved)
- **New Disk Manager with Improved Disk Utilities**
- **All Cables & Instructions** Including a free TI RS232 Y-Cable.

For above system with full size DS/DD Disk Drive

\$399.95

For above system with a pair of 1/2-height Drives

539.95

Other leading CorComp Hardware Values:

CorComp RS232 Card (for TI P-Box)	79.95
CorComp 32K Card (for TI P-Box)	99.95
CorComp 256K P-Box Card	169.95
CorComp 512K P-Box Card	229.95
CorComp 256K Stand Alone	249.95
CorComp 512K Stand Alone	269.95
CorComp DS/DD Controller (for TI P-Box)	149.95
CorComp 9900 System with Free RS232 Y-Cable	299.95
CorComp Stand Alone RS232 with Free Y-Cable	109.95
NEW CorComp Stand Alone 32K	89.95
NEW Triple Tech P-Box Card (Clock/Buffer)	109.95
NEW 9900 Clock Stand Alone	69.95
"Grom Buster" (for 1983 Consoles)	24.95
Load Interrupt Switch (with FREE Screen Dump Program)	19.95
NEW PDI Diagnostic Module	24.95

Also available from TEX-COMP

TI-99/4A Console w/1-year warranty (Black & Silver model)	79.95
NEW Star NX-10 (Fully TI Compatible). Replaces SG-10	
solid state dipswitch selection—Free Cleaning Kit	259.95
1/2-Height DS/DD Disk Drive (2 will fit in P-Box)	99.95
Full Size SS/SD Disk Drive (exact replacement for TI 1250)	79.95
Full Size DS/DD Disk Drive	99.95
Drive Enclosure with Regulated Power Supply for 2 1/2-height or 1 full Drive	59.95
Cable Kit for 2 1/2-height Drives (for installation in P-Box)	29.95
Cable Kit for Stand-Alone Drives (specify TI or CorComp system)	29.95
RS2323 Y-Cable	10.95

SEND \$2.00 FOR NEW 1986 CATALOG WHICH INCLUDES A \$5.00 SAVINGS CERTIFICATE.



VISA and MASTERCARD
HOLDERS CALL DIRECT
(818) 366-6631

SEND ORDER AND MAKE CHECKS PAYABLE TO

TEX⁺COMP™

Texas Instruments



P O BOX 33084 — GRANADA HILLS CA 91344 AUTHORIZED DEALER

add 3% for credit card orders

TERMS: All prices F.O.B. Los Angeles. For fastest service use cashiers check or money order. Add 3% shipping and handling (\$3.00 minimum). East of Mississippi 4 1/2%. (Free shipping on all software orders over \$100.00). Prices and availability subject to change without notice. We reserve the right to limit quantities.

NOTE: Payment in full must accompany all orders. Credit Card, Company Check or Money Order for immediate shipment. Personal checks require up to 4 weeks to clear. California orders add 8 1/2% sales tax.

"The Leader of the Pack"



**COMPLETE
EXPANSION SYSTEM
NOTHING ELSE TO BUY!**

**ALL FOR
\$379.95**

Plus S&H

FORTHRITE

#02
Mini Word Processor in FORTH

By **HOWARD H. ARNOLD**

Here's another Forth program that again attempts to prove that *useful* programs can indeed be written in this language. Forthrite is a mini-word processor. It lacks many of the sophisticated features of bigger word processing programs, but compensates for this by being extremely simple, easy to use, and quick.

It also is an excellent exercise in Forth for those who may be just learning the language. The entire processor consists of just two screens and a revised screen 20 used as the menu and the complete operating instructions! Honest!

This great simplicity is achieved by making use of the excellent full-screen editor already contained in the Forth system disk as provided by TI. All we need do is to make provisions for margins, for sending output to the printer and for storing the text in easily identified files.

Without undue apology, I'll list some of the features found in professional word processors which you'll find missing in Forthrite. Perhaps most noticeable, word-wrap is not provided. You must watch the screen as you approach

the line length that you have set for your file and go to the next line by hitting ENTER. This may actually be an advantage because you can see how the margins will appear in your printed copy and use hyphens or not in order to split words, just like we used to do with a good old typewriter! You have the advantages of all the editing features of the TI Forth editor, however, in deleting or adding characters, erasing or moving lines, etc.

The other noticeable difference between Forthrite and the "high-priced spread" is that you do not scroll continuously between screens, but you must overtly change to the next screen (FCTN 4) when you reach the end of the screen on which you're working. And lastly, you must add a caret at the start of a line to mark the end of the file for your printer.

On the positive side, you can store up to 50 kilobytes of text, split between five files, all of which can be instantly accessed through Forth's virtual memory capability.

Let's talk about the simple screens which constitute the word processor first. Then we'll review an installation pro-
(See Page 24)

MYARC GENEVE™

Model 9640 Family Computer **\$409⁹⁹**

FREE SHIPPING ANYWHERE IN CONTINENTAL U.S.A. ON GENEVE a \$10⁰⁰ value

Other Fine Myarc Products:

Disk Control Card Model DDCC-1	\$145⁰⁰	128K MEMORY CARD 512K	\$145⁰⁰ \$239⁹⁹
-----------------------------------	---------------------------	--------------------------	--

COMBOS

ANY MEMORY EXPANSION CARD PLUS EXTENDED BASIC LEVEL IV
ADD \$50⁰⁰ to CARD PRICE!!!!

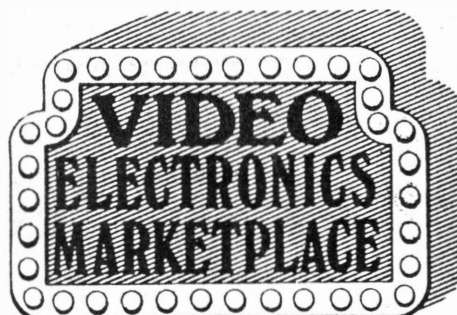
MYARC

MPES Standalone Expansion System
32K **\$299⁹⁹** W/O Drives
128K **\$318⁹⁹** W/O Drives
HALF HEIGHT DRIVES DS/DD **\$109⁹⁹** EA

TEXAS INSTRUMENTS SOFTWARE SALE

CAR WARS—INVADERS—MUNCHMAN
OLDIES II—ATTACK—DIVISION I
ANY 5 FOR **\$9⁹⁹**
YOUR CHOICE
TI DUAL JOYSTICKS **\$4⁹⁹** ea.
TI CASSETTE CABLE **\$1⁹⁹** ea.
TI WRITER **\$24⁹⁹**
TI LOGO II **\$19⁹⁹**

DISK FILE
HOLDS 70-5 ¼ disks
\$7⁹⁹



**458 Pleasant Street
Brockton, MA 02401
(617) 559-8935**

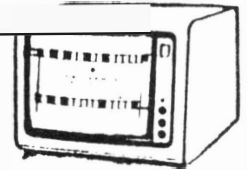
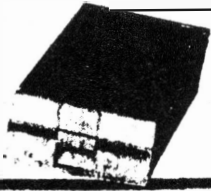
ANNOUNCING

MINI WRITER II and III WORD PROCESSOR
MODULES NOW WITH LEFT AND RIGHT MARGINS
MINI WRITER II **\$24⁹⁹** W/O cable
MINI WRITER III **\$29⁹⁹** W/O cable
CONNECTING CABLE **\$11⁹⁹**

**ATTENTION DEALERS
SAVE BIG BUCKS ON ALL ITEMS!!**

Dealer Inquiries Requested
ALL MAJOR CREDIT CARDS ACCEPTED
LIMITED QUANTITIES ON SOME ITEMS

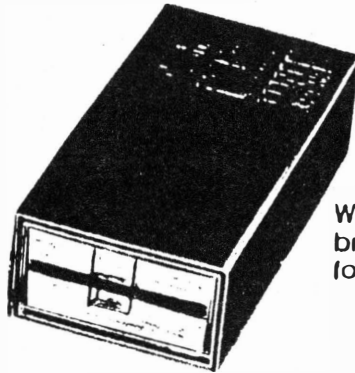
UNBELIEVABLE PRICES ON 2 IMPORTANT PERIPHERALS



ADD A 2ND DISK DRIVE TO YOUR TI/99/4A SYSTEM FOR ONLY

Comes complete with drive, case, power supply & cable. Ready to connect.

By adding a second drive to your system you can free yourself from swapping program and data disks on many programs. You can also make backups without any disk swapping.



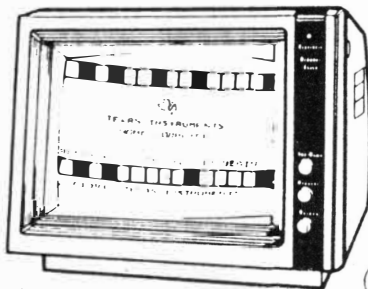
\$129⁹⁵

Plus S&H

ADD \$20.00 for
DS/DD Drive.

EXTRA VALUE BONUS

With each disk drive ordered we are including a HEAD brand disk drive head cleaning kit which regularly sells for \$15.95.



MONITOR CABLE INCLUDED !!

Special
FACTORY
Purchase

color monitor

Composite Video for use with computers, tuners, VCRs and video discs.

\$129⁹⁵

TEX-COMP has purchased a truck load of 13" COLOR MONITORS at a special price. These monitors are built by two of the leading names in consumer electronics, Samsung and Goldstar and come with a 90 day factory warranty on parts and labor. A TI-99/4A monitor cable is included at no extra charge. There is no comparison between a monitor and a TV set when it comes to computing. The monitor picture is sharper, clearer and more vivid. Works great with your VCR too.

330 X 330 Resolution Add \$10.00 for shipping and insurance

Send order and make checks payable to:

TEX+COMP

P.O. BOX 33064 - GRANADA HILLS, CA 91344



AUTHORIZED DEALER



VISA and MASTERCARD
HOLDERS CALL DIRECT
(818) 366-6631
24 Hour Order Line

TERMS: All prices F.O.B. Los Angeles. For fastest service use cashiers check or money order. Add 3% shipping and handling (\$3.00 Minimum). East of Mississippi 4 1/2%. Add 3% for Credit Card orders. Prices and availability subject to change without notice. We reserve the right to limit quantities.

NOTE: Payment in full must accompany all orders. Credit card, Company check or Money order for immediate shipment. Personal Checks require up to 4 weeks to clear. California orders add 6 1/2% sales tax.

FORTHRITE—

(Continued from Page 22)

cedure that gets it on your Forth disk for easy access and use.

Screen 30 declares and initializes variables for margins (MARG), line length (L/LENGTH), line number (LINE#) and the block number of the text buffer (BUF).

CHBF is provided to permit you to choose at which block you wish to store your text. You can choose any one of five storage blocks, permitting the simultaneous storage of up to five 10K documents.

Screen 31 provides instructions for changing margins (CHMARG) and line length (CHL/LENGTH). These words simply print appropriate instructions on the screen for changing from the default values for these variables. The word GO puts you into the editing mode from the menu and setup screens.

The word RITE is provided to initiate the writing function, calling all the above words.

PRINT initiates the printing operation, calling PRTPAGE to print one screen of stored text at a time. If a caret is found at the start of a line, the printing operation is aborted, returning you to Forth. In order to re-enter the editing or printing mode it is necessary only to type RITE or PRINT. PRTPAGE also keeps track of lines printed and skips over perforations. And of course PRINT calls PRTPAGE repeatedly until a caret is found at the start of a line, indicating the end of the file, or until all 10 blocks of text have been printed. Simple enough?

Now to install the silly thing! First load the Forth system. Then load the bsave, print and editor screens, preferably in that order. To do this type:

—BSAVE (ENTER)
—PRINT (ENTER)
—EDITOR (ENTER)

Then type:

: MENU CR 272 257 DO I MESSAGE CR LOOP CR CR CR ; (ENTER)

Be prepared to ignore the "MENU is not unique" message you should now receive at your terminal. Next edit screen 20 to make it read as shown in the listing printed here.

After entering and saving screens 30 and 31, load them into the system with the commands:

30 LOAD (ENTER)

It's now probably a good idea to clear all the screens from 40 through 89 by defining a word CLEARBUF as follows:
: CLEARBUF 90 40 DO I CLEAR LOOP ; (ENTER)

Then calling the word:

CLEARBUF (ENTER)

And finally:

FORGET CLEARBUF

Typing RITE should now put you in business. If everything checks out OK, save the system to a binary file with the sequence:

' TASK 21 BSAVE (ENTER)

Then edit screen 3 and add the words 15 BLOAD MENU ABORT following the comment (QUIT OFF!) on line 1.

The only remaining task is to rename the FORTH file on your disk to something a bit more descriptive of the application. I used Disk Manager 2 to rename FORTH to RITE.

Although the author feels that this application is simple enough to be entered from the keyboard and easily debugged, he will provide a freeware disk with the finished binary code as well as source screens. Send \$5 for postage and handling to Howard H. Arnold, 210 Beech Valley Rd., Lewisville, NC 27023.—Ed.

```
SCR #20
0 ( FORTHRITE-A Mini Word Processor
1
2   RITE permits entering text
3
4   <FCTN> 4 for next screen
5   <FCTN> 6 for prev screen
6
7   CARET (^) at the start of a
8   line terminates text.
9   then <FCTN> 9 and FLUSH
10
11  PRINT sends all stored text
12  to the printer.
13
14  MENU gets this screen.
15
```

```
SCR #30
0 ( FORTHRITE)
1 8 VARIABLE MARG 64 VARIABLE L/LENGTH 0 VARIABLE LINE#
2 40 VARIABLE BUF
3
4 : CHBF      ." CHOOSE BUFFER YOU WISH TO USE" CR
5   ."      <1> BLOCK 40 " CR
6   ."      <2> BLOCK 50 " CR
7   ."      <3> BLOCK 60 " CR
8   ."      <4> BLOCK 70 " CR
9   ."      <5> BLOCK 80 " CR KEY
10  CASE      49 OF 40 BUF ! ENDOF
11            50 OF 50 BUF ! ENDOF
12            51 OF 60 BUF ! ENDOF
13            52 OF 70 BUF ! ENDOF
14            53 OF 80 BUF ! ENDOF ENDCASE !
15 -->
```

```
SCR #31
0 ( FORTHRITE)
1
2 : CHMARG CR ." Default Margin is 8 : " CR
3   ." To change type n MARG ! " CR
4   ." where n is the new margin " CR CR !
5 : CHL/LENGTH ." Default Line Length is 64 " CR
6   ." To change type n L/LENGTH ! " CR
7   ." where n is the new Line Length " CR CR CR
8   ." type GO to start editing " !
9 : GO BUF @ EDIT !
10 : RITE CLS CHBF CHMARG CHL/LENGTH !
11
12 : PRTPAGE DUP 1024 + SWAP DO SWCH I DUP C@ 94 = IF
13   UNSWCH ABORT THEN MARG @ SPACES L/LENGTH @ TYPE CR
14   1 LINE# +! LINE# @ 55 > IF 0 LINE# ! 12 EMIT THEN 64 +LOOP !
15 : PRINT BUF @ DUP 10 + SWAP DO I BLOCK PRTPAGE +! LOOP !
```

Bowling League Manager released

Ken Hayden, Ph.D., announces the release of his program Bowling League Manager.

The program is described as capable of being used for team statistics, bowl-

er statistics, substitutes, league rosters, mailing labels and more.

Requirements are Extended BASIC, a 32K card and at least one disk drive.

RS232 and a printer are optional.

Price is \$29.95 plus \$2. shipping.

For further information or to order, write Hayden at 1111 Park Ave. 303, Baltimore, MD 21201.

4FRONT MAGAZINE for the T199/4a

Dear America,

With regard to NEW DAY COMPUTING and 4FRONT, let me first give you some background information:

I have been involved for some years in the TI scene over here, and last year decided to start up a computer business of my own, with the TI taking up about half of my resources and sanity. The idea of a mag on cassette was born, and the fact that many scoffed at the thought ('leave the idiot to it - he'll soon realize he's wasting his time') only made me more determined to have a go. After much time, money, and hair dropping out, the first issue hit the streets. To my shock, reaction was embarrassingly good! In essence, the TAPE version is made up of articles and programs that will run in Basic OR Extended Basic. Some of the programs, however do need Exbas, PRK etc. The DISK version assumes Extended Basic/32k as standard. There are programs on tape in Basic that do not appear on the disk version, and items on disk that could not be included on cassette - eg Ed/Ass material. That way everyone gets good value according to his configuration. There are hints, tips, utilities, games, in fact all that you'd expect to find in a magazine - but ready to run!

Prices outside Europe:

Single issue

Annual sub (quarterly)

- POUNDS 6.00 (airmail)

- POUNDS 22.00 (airmail)

- POUNDS 19.00 (seamail)

Bulk sub for User Groups:

(min. 10 copies to one address)

- POUNDS 18.00 ea. (air)

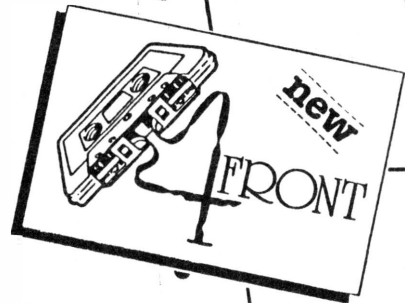
- POUNDS 15.00 ea. (sea)



Payment by bank draft drawn on London in pounds sterling please.
Clubs and users requested to respect copyright!
Please state single or double sided when ordering disk version.

Well, that's about it. Go on, spoil yourself and try it. Then if you like it, don't pirate it, get your friends to purchase their own copy, thus keeping one balding English idiot half-sane for a little while longer....

Harry Pridmore



New Day

COMPUTING

TEL
0404-
41856

New Day Computing, Jerrard Close, Honiton, Devon, England EX14 8EF

GPL Assembler update

Bagnaresi offers new GPL Loader

By JOHN CLULOW

The review of the Weiland GPL Assembler (August 1986) noted that a loader for the Millers Graphics GRAM Kracker was not yet available. Paolo Bagnaresi has provided an elegant solution; one which should work for *any* GRAM simulating device and for *any* assembler which uses standard E/A object code tags. The source code is given below.

The program modifies the machine language for the standard E/A Option 3 loader. Whenever the loader would ordinarily write data to CPU RAM, the change makes it branch instead to Bagnaresi's GRMW routine. This routine simply puts the data in GRAM instead of CPU RAM and then returns to the E/A loader. Thus, this method allows all features of the E/A loader including the loading of multiple files and use of relocatable code (although the Weiland assembler generates only absolute code).

When the object file for the Bagnaresi modification is loaded, the GRAM routine is automatically run and the loader is placed in GPL mode. After all GPL files have been loaded, the E/A loader can be returned to its original status by entering 'CPURAM' at the Program Name prompt. Files written in 9900 assembly language can then be loaded as usual.

Of course, this method entails use of an E/A Option 3 loader. One approach would be to load the GRAM emulating device with the E/A module. The Option 3 loader can then be selected as usual and the Bagnaresi object file loaded. However, because the E/A module uses GROM 3 (H6000 to H7FFF), the GPL object files to be loaded must not overwrite this area.

Another restriction associated with use of the E/A module is that once any of the following occur, the loader returns to normal, CPU RAM mode: (a) the user exits the Load and Run screen; (b) a program is executed via the Run prompt; or (c) a file error occurs. In order to reinstate GPL mode, the Bagnaresi object file must be reloaded.

You can get around most of these restrictions, however, by using Bagnaresi's LAR file from a new version of his BEAXS disk: Bagnaresi Ed-Asm for Extended BASIC System. (Dr. Bagnaresi is also creator of BA-Writer, an Extended BASIC version of TI-Writer.) This version of BEAXS is available from the Southern California Users Group, P.O. Box 21181, El Cajon, CA 92021. Address your correspondence to Mrs. LaVerne Searcy, secretary and librarian of the users group. Program and documentation disks are available for \$6. Make sure you specify the "MICROpendium—GPL Loader" version of BEAXS if you decide to order it.

Because the Option 3 Loader from the BEAXS disk is in

(See Page 28)

GRAM Loader

```

*-----*
*          GENERAL PURPOSE GRAM/RAM LOADER          *
*-----*
* PAOLO BAGNARESI, Via J.F. Kennedy 17,             *
* 20097 San Donato Milanese, Italy - Phone (02)-514.202 *
*-----*
* THIS CODE MODIFIES THE E/A OPTION 3 LOADER SO THAT IT *
* WILL LOAD EITHER GRAM (GPL) OR CPU RAM AS USUAL. THIS *
* PROCEDURE SHOULD WORK WITH EXISTING AND FUTURE GRAM *
* EMULATING HARDWARE DEVICES - GK, MAXIMEM, ETC. AND WITH *
* ANY GPL ASSEMBLER USING STANDARD E/A TAG CHARACTERS. *
*-----*

DEF CPURAM,GRAM ROUTINE NAMES USED TO SET THE LOADER
AORG >3E00          PUT THESE AT END OF LOW 8K

* SET SO THE LOADER PUTS CODE IN CPU RAM AS USUAL
CPURAM LI R0,>DDC0 >DDC0 IS OFCODE OF 'MOVB R0,*R7+'
MOV R0,>24B6 AT >24B6, IN THE E/A LOADER ROUTINE.
LI R0,>DDE0 >DDE0 IS OFCODE OF 'MOVB >20DB,*R7+'
MOV R0,>24B8 (>20DB IS THE RIGHT BYTE OF R0).
RT          RETURN TO CALLING PROGRAM

* SET SO THE LOADER PUTS CODE IN GRAM MEMORY INSTEAD
GRAM LI R0,>0460 >0460 IS OFCODE FOR BRANCH
MOV R0,>24B6 REPLACE THIS FOR OLD INST AT >24B6
LI R0,GRMW GRMW IS ADDRESS OF OUR ROUTINE
MOV R0,>24B8 REPLACE THIS FOR OLD INST AT >24B8
RT          RETURN TO CALLING PROGRAM

*-----*
* THE 'GRMW' ROUTINE BELOW WILL BE EXECUTED IF THE 'GRAM' *
* ROUTINE ABOVE HAS BEEN EXECUTED. R0 CONTAINS THE WORD *
* TO BE WRITTEN TO THE ADDRESS IN R7. *
*-----*

GRMRD EQU >9800 GROM READ DATA
GRMRA EQU >9802 GROM READ ADDRESS
GRMWD EQU >9C00 GROM WRITE DATA
GRMWA EQU >9C02 GROM WRITE ADDRESS

SAVGR DATA 0 WORD WHERE GROM ADDRESS IS SAVED

* SAVE CURRENT GROM ADDRESS
GRMW MOVB @GRMRA,@SAVGR GET FIRST BYTE
NOP WAIT
MOVB @GRMRA,@SAVGR+1 GET SECOND BYTE
DEC @SAVGR CORRECT FOR AUTO INCREMENT

* REPLACE IT WITH NEW GRAM WRITE ADDRESS

MOVB R7,@GRMWA MOVE MSB OF R7 (CONTAINS LOAD ADDRESS)
SWPB R7 SWAP MOST AND LEAST SIGNIFICANT BYTES
MOVB R7,@GRMWA MOVE LSB OF R7 (REST OF LOAD ADDRESS)
SWPB R7 RESTORE R7 TO ORIGINAL CONDITION
INC R7 INCREMENT R7 FOR FIRST BYTE OF WORD

* WRITE FIRST BYTE TO GRAM

MOVB R0,@GRMWD MOVE 1ST BYTE TO GRAM WRITE DATA ADDR
SWPB R0 SWAP MSB AND LSB OF R0

* WRITE INCREMENTED GROM ADDRESS

MOVB R7,@GRMWA MOVE MSB OF R7 (WITH LOAD ADDRESS)
SWPB R7 SWAP MOST AND LEAST SIGNIFICANT BYTES
MOVB R7,@GRMWA MOVE LSB OF R7 (REST OF LOAD ADDRESS)
SWPB R7 RESTORE R7 TO ORIGINAL CONDITION
INC R7 INCREMENT R7 FOR SECOND BYTE OF WORD

* WRITE SECOND BYTE TO GRAM

MOVB R0,@GRMWD MOVE 2ND BYTE TO GRAM WRITE DATA ADDR
SWPB R0 RESTORE R0 TO ORIGINAL STATE

* RESTORE OLD GROM ADDRESS

MOVB @SAVGR,@GRMWA WRITE FIRST BYTE
NOP WAIT
MOVB @SAVGR+1,@GRMWA WRITE SECOND BYTE

* CONTINUE EXECUTING THE E/A LOADER

B >24BC AFTER MOVB >20DB,*R7+ IN E/A LOADER

* STOP ASSEMBLY AND INDICATE START ADDRESS
END GRAM START EXECUTION IN THE GPL LOADER MODE

```



RAVE 99



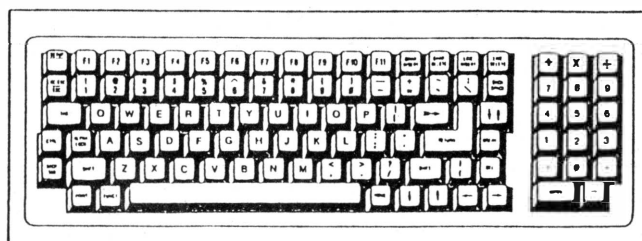
JUST IN TIME FOR CHRISTMAS! Treat yourself to the first keyboard upgrade for your 99/4A. Your word processing and spreadsheets never had it so good! All RAVE 99 Keyboard Enhancements come with an easy to install interface card that installs easily inside your computer console. No soldering required. It works with any system because it connects to the computer. PE Box NOT REQUIRED.

Both RAVE 99 Keyboard Enhancements are ready for delivery right now. Don't delay. Make your 99/4A into the computer you knew it always was.



TWO MODELS!

MODEL 99/101



\$164.95
+S&H

- * Full featured key layout with 101 keys. Four separate key assignment modes built in allowing one key input for nearly all TI WRITER and MULTIPLAN commands.
- * Separate number pad and cursor arrow keys.

MODEL 99/84



\$149.95
+ S+H

- * Improved version of popular personal computer keyboard. Lighted CAP LOCK and NUM LOCK status indicators.
- * One key entry of Function commands. *Adjustable tilt angle.
- ****BOTH models support user installed LOAD INTERRUPT and RESET from the keyboard.



NOW AVAILABLE

Avoid the rush. Both models available in time for gift giving. Treat your fingers to the pleasures only available on those "other" computers until now. For product or ordering information, write: RAVE 99, 23 Florence Road
Bloomfield, CT 06002

OR call (203) 242-4012 for faster service.

- * Also available Custom console Cover \$4.95 - Covers hole left from removing standard keyboard. LOAD/RESET Installation Kit \$4.00 - Cable with connector for installing optional keyboard features. S&H add 5%. (CT only 7.5% tax)

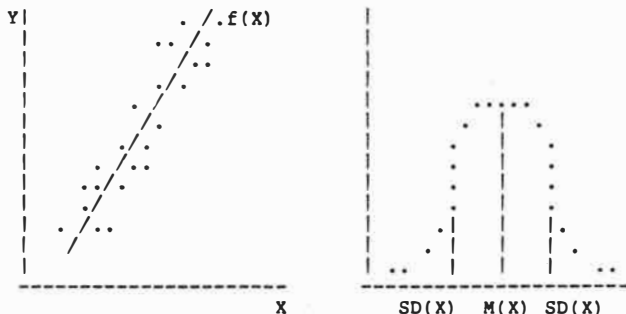


VISA & MasterCard Add 3%



NEW !!!

STATISTICS PROGRAM



If your work requires estimating, simulating, or projecting relationships among data, this program can be a powerful addition to your T.I. 99/4A library.

FEATURES:

- accepts 15 variable (100 obs. each) datasets.
- computes descriptive statistics and correlation coefficients.
- runs regressions with up to five predictor variables, plus constant term.
- computes regression coefficients, t-statistics, R-squared, F-statistic and standard error of estimate.
- accepts data from the keyboard, program disk, or other disks.
- very user friendly: 41 screen prompts to guide you, each numbered and explained in detail in the user manual.
- pre-tested; 90 day free replacement warranty.

EQUIPMENT NEEDED:

99/4A console, ext. basic, 32k, disk drive and printer.

PROCESSING TIME:

Means, standard deviations, correlation coefficients: about 3 minutes computation time for large data sets.

Regression statistics: for 3 or less predictor variables, plus constant—a few seconds to two minutes; for 4 predictors—ten minutes; for 5—about one hour.

PRICE: \$19.95 U.S. (+ \$3.50 s+h). Add 7% if NY resident. Check or money order.

Send to:

HEIM INDUSTRIES
P.O. BOX 296
CLIFTON PARK, NY 12065

GPL ASSEMBLER UPDATE—

(Continued from Page 26)

CPU RAM, all GRAMS are available for user programs. The BEAXS disk must be in DSK1 when the LAR file is loaded. With the MG GRAM Kracker, the 1 Load Module option is used with filename DSK1.LAR. With MAX-IMEM (reviewed June 1986), the Option 5 loader of the resident E/A can be used to load DSK1.LAR. (The switch is set to MAXIMEM before loading GPL files.)

Other GRAM emulating devices may not allow direct loading of the LAR file. If either the E/A or TI-Writer module is loaded into a device, the Option 5 or utility loader can be used to load LAR. Once program control is transferred to LAR, of course, GRAM 3 becomes available for user programs. Horizon RAMdisk users with the John Johnson MENU ROS can use Funlwriter's utility option to load LAR, and there are other ways it can be loaded with other configurations.

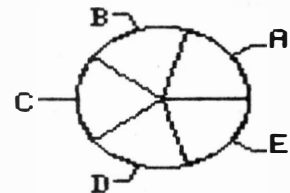
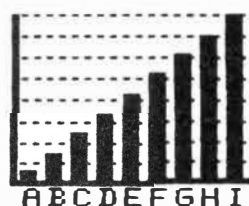
In addition to making GRAM 3 available, use of the LAR program allows file errors and leaving the Load and Run screen without loss of GPL mode. However, if Option 4 (RUN) is used the object program must be reloaded to load additional GPL files—load all files into GRAM and CPU RAM before executing any program.

Readers who wish to contact Dr. Bagnaresi directly may do so by writing to: Paolo Bagnaresi, Via J.F. Kennedy 17, 20097 San Donato Milanese, Italy

EXTENDED BUSINESS GRAPHS II

New
Version!

(C) 1986



FEATURES: Bar Graphs, Pie Charts, 3-D Graphs, and Linear Graphs Compatible With JOY PAINT!
Requires: TI 99/4a, 32k, Disk Drive, and Ex-Basic. Epson Compatible Printer is optional.

\$24.95 Postpaid.

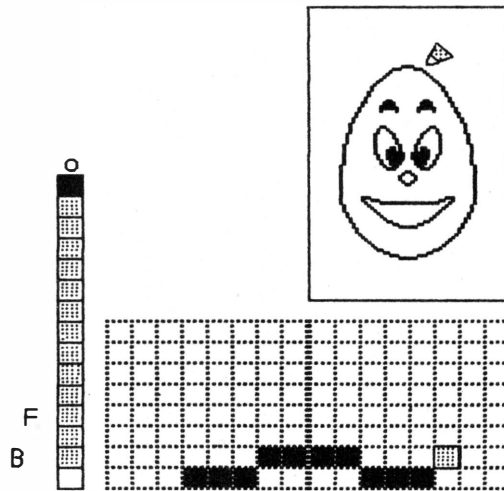
GREAT LAKES SOFTWARE

804 E. Grand River Ave.

Howell, MI. 48843

THIS ADVERTISEMENT WAS CREATED USING
JOY PAINT 99!

CHARAMAT is a graphics development tool for Extended Basic programmers. It consists of an editor and 16 support routines all written in assembly language. The editor performs the following four functions at the same time:



52

- * Allows you to draw smoothly within a rectangular window, in which 8 times 14 characters of Extended Basic are shown without spaces in between. In other words, you draw an instance of size 64 times 112 pixels.
- * Displays the current character being drawn, magnified by a factor of 8. The left adjacent character is also displayed.
- * Shows the ASCII code of the current character.
- * Shows the colors of the current character. Colors can also be changed with the editor.

The editor has many additional features. It can, for instance, be used in debugging an Extended Basic program. - The 16 support routines allow use of the computer's memory for the storage of graphics data and perform data transfer to disk with assembly language speed. They open a new dimension to programmers interested in print graphics or screen animation. - The editor is easy to use and makes short work out of creating Extended Basic graphics.

\$39.90 Requires 99/4A, TI Extended Basic, 32K, disk.

PRINT DESIGNER allows full use of the graphics capabilities of the Micronics S6-10 and NX-10 printers. It prints in three modes (compare the flower designs):

- (1) single density
- (2) double density horizontally and vertically
- (3) quadruple density horizontally and double density vertically

Pictures are first drawn for print modes (1) and (2). Next a special routine can be used to double every pixel horizontally and make the picture ready for print in mode (3). The design can then be refined anywhere you want. A picture may have up to 1920 pixels horizontally and is limited vertically only by what fits on a disk. Use with GRAPHX, TI-Artist or our own graphics design program, BIGCHAR, which is included. Produce fancy letterheads and labels, fill the Christmas and New Year days creating a full page picture, or just print your GRAPHX or TI-Artist screens in double density format.

\$29.90 Requires 99/4A, TI Extended Basic, 32K, disk, S6-10 or NX-10.
Two disk drives are required for use with GRAPHX or TI-Artist.

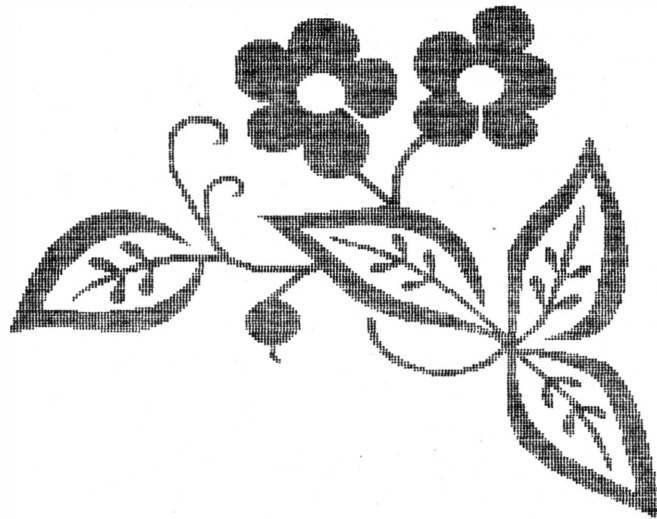
This ad was all made with PRINT DESIGNER and an NX-10 (using Basic for the text).

**Desaca
Soft**

BOX 828, MENDOCINO, CA 95460

California orders add 6% sales tax.

All trademarks are assigned to respective owners.



Myarc demonstration of 9640 highlights Chicago's TI-Faire

By JOHN KOLOEN

No matter where he goes, Lou Phillips is surrounded.

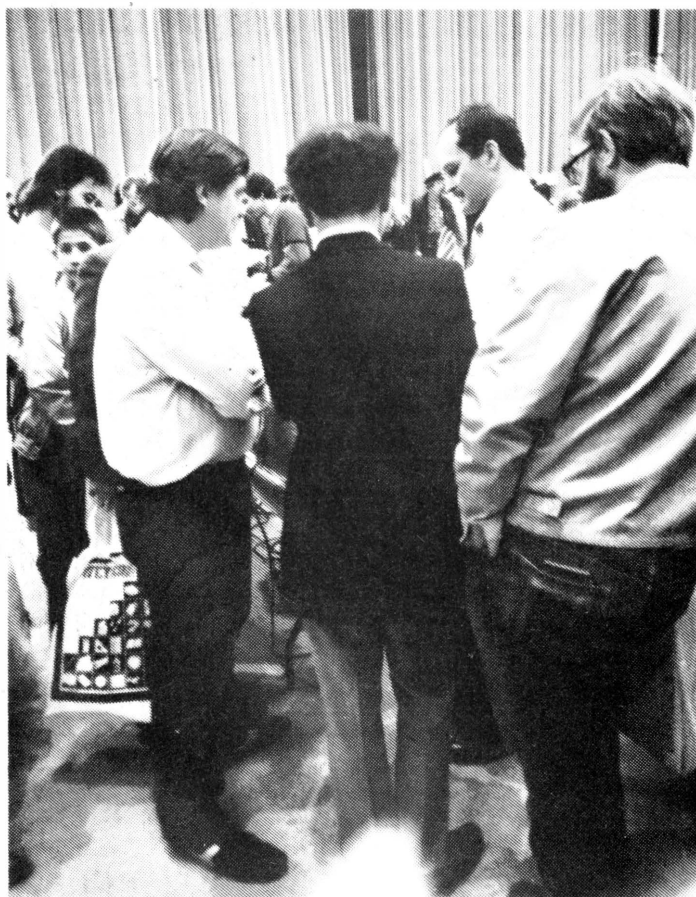
The president of Myarc Inc. and chief drumbeater for the company's much-discussed 9640 computer, Phillips is accustomed to spending hours fielding questions from TI users. There seems to be no end to the number of questions he takes on, whether they are asked by visitors to this company's booth on an exhibit floor or behind a podium in a packed conference room. Always there is patience in his voice, no matter how many times he hears the same question. And always he is animated when he speaks about his company's products, particularly the 9640, dubbed the Geneve ("it's just a catchy name," Phillips insists).

Trying to visit with Phillips requires patience. It is not uncommon for a ring of people three deep to surround his booth, each person waiting to get a question or comment. The wait can last a half-hour. Phillips seldom gives a yes-or-no answer to even the simplest question. And his listeners seem to like it that way.

Unlike last year's Chicago TI Faire, at which a demonstration of Myarc's computer was promised but never materialized, this year Phillips brought along "the first production board" of the 9640. The board, which was fitted into a Peripheral Expansion Box, included 512K of dynamic RAM, a Texas Instruments 9995 microprocessor, a boot ROM, a high-speed, no wait state static ROM for storing the code for floating point arithmetic and to display images on the screen, a real time clock and the same sound generator chip as used in the 4A. The board uses the same 9901 chip as in the 4A as an interrupt controller. A 9938 chip, produced jointly by Microsoft and Yamaha, with 128K of DRAM, is also on the board. Connectors include an 8-pin DIN connector for video, five pins of which are the same as the composite video connector used on the 4A. Users will thus be able to use their present monitor with the 9640. The remaining three pins are for RGB blue and green and the RGB synch signal. A jumper is used for the red signal. A user will be able to select RGB or composite display at any time. The board also includes ports for a mouse, joystick and IBM compatible keyboard. The only things not supported by the board is a cassette port and cartridge port.

The built-in mouse interface is compatible with the Commodore Amiga mouse. The RGB connector is also Amiga compatible. The joystick port is the same as used on the 4A.

The software bundled with the 9640 includes a disk operating system that is similar to MS-DOS 2.1. Commands are virtually "the exact same," Phillips said. Also included is Advanced BASIC by Myarc. Patches for TI-Writer and



In a crowd

Lew Phillips, second from right, was in his element at Chicago's TI Faire. The president of Myarc Inc. demonstrated his company's new computer, the 9640, at the event.

software to save cartridges to disk will also be provided. The format of the cartridge-saving software is the same as used by Miller Graphics' GRAM Kracker. Thus, those who have saved cartridges to disk using GK will be able to load the software into the 9640.

According to Phillips, production of the board is being held up because the gate array is not available. "This is the chip that should have been in long ago, and it's one that we custom-designed ourselves. It has 84 pins on it, 21 on a side. The gate array contains all the logic, the dynamic RAM refresh logic, the wait state logic so we can run this machine at various speeds.... It also handles the memory mapping

(See Page 32)

AT LAST—A COMPLETE PRINT SHOP PACKAGE FOR THE TI-99/4A

THE PRINTSHOPPE 99™ Desktop Publishing System
Now with GRAPHX II - Quick Load + Flip & Rotate

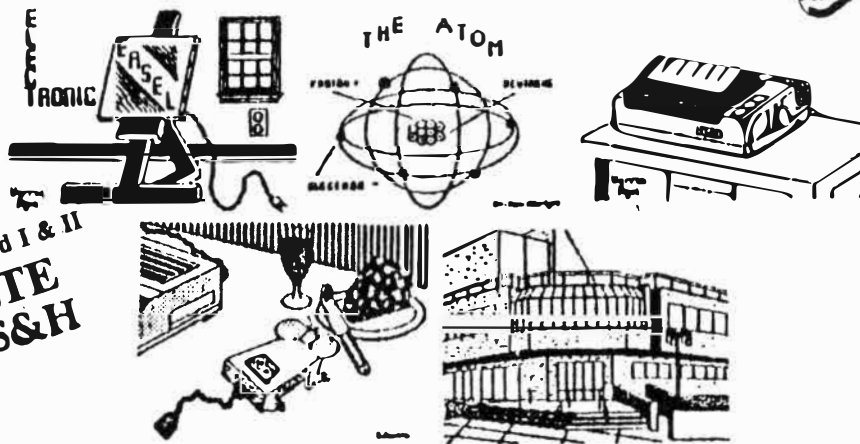
Now create your own newsletters, advertisements,
signs and greeting cards with this new package.

INCREDIBLE NEW FONTS

TINY LARGE WEIRD SLANTED

FOR ALL OCCASIONS

CLIPART AND PICTURES TOOL



GRAPHX & Asgard I & II
COMPLETE
\$47.95 + S&H

PACKAGE INCLUDES GRAPHX II + 2 COMPANION DISKS

Tex-Comp has gone all the way to Australia to directly import the latest extended basic version of GraphX and has combined it in a user-friendly package with 4 outstanding companion disks from Asgard, which are filled with 24 sets of fancy typestyles (fonts) and a huge collection of clip art pictures which can be printed out to make labels, illustrations, letterheads, etc. The companion disks contain a total of 14 clip art files with each file containing an assortment of different pictures.

By using GraphX together with these 4 companion disks, you'll have the ability, not only to create your own graphics, but also an outstanding collection of ready-to-use illustrations & typestyles. Requires 32K, disk drive, joystick and Epson or Star compatible printer.

ADD \$7.95 for the newly released Companion Disks III by Asgard
MANY MORE TYPE FONTS, CLIP ART AND SPECIAL FEATURES!!!

Send order and make checks payable to:

TEX+COMP

P.O. BOX 33054—GRANADA HILLS, CA 91344



AUTHORIZED DEALER



VISA and MASTERCARD
HOLDERS CALL DIRECT
(818) 366-6631
24 Hour Order Line

TERMS: All prices F.O.B. Los Angeles. For fastest service use cashiers check or money order. Add 3% shipping and handling (\$3.00 Minimum) East of Mississippi 4½%. Add 3% for Credit Card orders. Prices and availability subject to change without notice. We reserve the right to limit quantities.

NOTE: Payment in full must accompany all orders. Credit card, Company check or Money order for immediate shipment. Personal Checks require up to 4 weeks to clear. California orders add 6½% sales tax.

©1986 TEX-COMP

SEND \$2.00 FOR NEW 1986 CATALOG WHICH INCLUDES A \$5.00 SAVINGS CERTIFICATE.

"The attitude we've taken all along is that one is certainly

A black and white photograph showing a large, dense crowd of people gathered in a large hall or auditorium. The people are standing and appear to be listening or participating in a meeting. The perspective is from an elevated position, looking down at the crowd. The hall has a high ceiling and some structural elements are visible. The crowd is diverse in age and appearance, and many are looking towards the front of the room.

Hundreds of TI users kept vendors busy throughout the day at the Chicago TI Faire.

THE TI-FAIRE: The Chicago TI-Faire, held every year at Triton Junior College, is the biggest all-TI gathering in the U.S.

Chicago-Area TI-99/4A Users' Group, Inc.
Don Jones (Membership Chairman)—Dept. M2
P.O. Box 578341 Chicago, Illinois 60657



from

Texas Instruments—TI 99/4A—COMPUTER COMPONENTS AND SOFTWARE

TEX+COMPTM

America's Number One TI computer retailer



TEX-COMP brings you special pricing on 3 of the **hottest** children's games ever produced for any computer at a **special holiday savings!**

"THE MAGNIFICENT THREE"

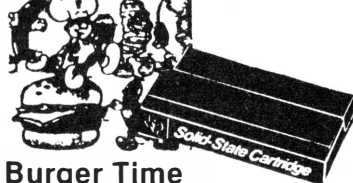
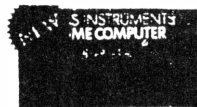
Three spectacular software cartridges just in time for holiday giving

ALL 3 for ONLY \$17⁹⁵ (Regularly 9⁹⁵ each)



Story Machine

Helps children write sentences, paragraphs, even simple stories while learning the parts of speech



Burger Time

One of the hottest arcade games in its original razzle-dazzle format. Your chef, Peter Pepper, is surrounded by pickles and hot dogs. Dodge 'em, pepper 'em, lead 'em down ladders and onto a bun before they make you the main course



Facemaker

Creative fun for children ages 5 to 7. Provides very simple introduction to programming and familiarity with keyboard



**Order the Complete
"Magnificent Three"**



VISA and MASTERCARD
HOLDERS CALL DIRECT

SEND ORDER AND MAKE CHECKS PAYABLE TO

TEX+COMPTM
P.O. BOX 33084 GRANADA HILLS, CA 91344

Texas Instruments



AUTHORIZED DEALER

add 3% for credit card orders

(818) 366-6631

TERMS: All prices F.O.B. Los Angeles. For fastest service use cashiers check or money order. Add 3% shipping and handling (\$3.00 minimum). East of Mississippi 4 1/2% (Free shipping on all software orders over \$100.00). Prices and availability subject to change without notice. We reserve the right to limit quantities.

NOTE: Payment in full must accompany all orders. Credit Card, Company Check or Money Order for immediate shipment. Personal checks require up to 4 weeks to clear. California orders add 6 1/2% sales tax.



9640 IN CHICAGO—

(Continued from Page 32)

are involved in the Myarc computer project.

Hoddie is modifying TI-Writer for 80-column display, which he demonstrated. Among the features of Hoddie's TI-Writer is the addition of a View File command that allows the user to look at a D/V or D/F 80 file on disk without having to load it into memory. Thus, a user would be able to work on a document in memory and look at a second document without erasing the first document from memory.

Other modifications may include moving the status line from the top to the bottom of the screen, a Show Directory command that will offer the option of listing only text files to the screen and the ability of the user to determine how much memory to devote to a text buffer. Mouse support for the cursor is also under consideration. The editor and formatter will reside in memory simultaneously.

Hoddie is also toying with the idea of creating a windowing capability that would include 255 columns. Text with 80 columns or less will be saved in D/V 80 format while text with longer lines will be saved in D/V 255, he said.

"Everything that is in TI-Writer is still there. You're not losing anything, but it's a lot faster," particularly with inserting and deleting functions, he said. The Find String function is also being changed so that it can be used to locate all occurrences of a string, rather than just the first occurrence. "It will work like the Replace String function," he said.

Phillips said that Mack McCormick is working on an 80-column patch for Microsoft Multiplan and Pecan Systems is supporting UCSD Pascal software, version 4.21. This will allow users to compile Pascal, Fortran 77, Cobol and BASIC. Myarc is also developing a two-pass BASIC compiler. Pike Creek Computers, producers of the TI-Count package of business programs, is developing business software for the system.

Charlton is modifying his Fast-Term



Computer on a card

Lou Phillips holds the 9640 computer in his hands. The single board is virtually a computer on a card.

terminal emulator for the new machine. Insebot, which markets TI-Artist, is developing a MacPaint equivalent and windowing software, Bright Data is developing professional business accounting software that will print reports while simultaneously allowing data entry, and Clint Pulley, developer of C for the TI, is developing a C Compiler. Asgard Software, DataBioTics and other companies are also developing software for the new machine, Phillips said. Asgard is working on a multi-tasking operating system similar to the DX10 operating system used on TI mini-computers.

"We feel that this will be a well-supported machine by the fact that it runs most 99/4A software. It will immediately start off with thousands of pieces (of software)," Phillips said. "As we all know, when Atari released (its) 520 they didn't even have a BASIC interpreter. But, painful as it was, we finally have our own BASIC inter-

preter, version 2.11, and we've been getting quite a few calls with raves as far as what it can do versus TI's Extended BASIC. And since our Extended BASIC 3 is based upon that we think it will be virtually bug-free or close to it on first release."

Existing 99/4A software that uses a keyscan method other than the standard console keyscan routine, such as Fast-Term and 4A-Talk, won't be compatible with the 9640, Phillips said. Also, some software won't work because of the timing used in addressing the VDP memory. "When we turn the machine on in the 4A mode, we look exactly like a 4A. Everything is memory mapped in the same place."

Noting the popularity of Lotus 1-2-3 in the PC and business market, Phillips said "that's the next area of concentration, a Lotus 1-2-3 look-a-like so that you can use your data disk from your IBM-PC and plug it in this machine."

Phillips said that benchmark tests between IBM-PCs using BASIC and the 9640 using BASIC 3 "we're running about 50 percent faster on some things than the PC. Considering the fact that all of our numbers are in double-precision floating point, I think that's saying something. What we're talking about is a machine that is about 50 percent more powerful than the PC and comes with the capability of addressing two megabytes."

Although the 9640 will be able to use files written using a PC, Phillips stressed that PC programs won't run on the machine, "because an 8088 is not a 9995. I want to have data file compatibility, but assembly language programs won't work. I would say that if anything we want to be compatible from the point of view of compilers and things like that."

"For example, there's a big difference between the TI BASIC interpreter and the Microsoft BASIC. In many respects the TI interpreter is much more powerful than the IBM, in its structure and its capability of interfacing with assembly language pro-

(See Page 36)

Introducing the greatest thing for 99/4A computer graphics since, well, the introduction of the 99/4A!

For years TI-99/4A owners have looked longingly at programs such as Printshop (R) and Newsroom (R) for Apple, Atari and Commodore computers. We all have wished we could do the things that Fontrix (R) does on the IBM PC. Well, now there is a program for the TI-99/4A that does these things, and because of the special features of the 99/4A, does a whole lot more.

Font Writer, by J. Peter Hoddie (a master programmer — author of Pre-Scan It! and system software for the Myarc Geneve computer) makes text and graphics come truly together for the first time on the 99/4A. Font Writer will combine any TI-Writer text files, TI-Artist or CSGD fonts, and TI-Artist instances the way you want them to make an otherwise drab report, letter or article come alive!

Font Writer, like TI-Writer, is more than one program. The first program in the package is Font Editor — a program that will let you edit existing TI-Artist or CSGD fonts, or create new ones from scratch. Font Editor contains an innovative editing window, dozens of powerful menu-selectable utilities, and supports even more powerful user-defined macro drawing commands for drawing often used figures with a single command. As powerful as it is, like all Asgard products it's designed to be friendly and easy-to-use. It is so flexible that you can even edit TI-Artist instances.

The real power of Font Writer, and it's most innovative part, is the Text Formatter. This program accepts standard TI-Writer files with virtually every imbedded text formatting command supported by TI-Writer, along with many new such commands for graphics support, to allow you to integrate text fully with graphics easily. Text Formatter accepts new commands for printing text in different fonts, including pictures and other graphics, and more. This easy-to-use program is as simple to use as TI-Writer, yet does so much more.

The last, but not in any way least program in the Font Writer package is a powerful organization tool for graphics files. If you have ever tried ordering and maintaining TI-Artist fonts, slides, instances and pictures, you will later wonder why you ever tried without it.

Font Writer requires Extended BASIC, 32K, and a disk drive system. TI-Writer and TI-Artist are highly recommended. Extensive documentation by Walter Howe is included. Available for a suggested price of \$24.95 from official Asgard Software dealers, from Teledata*Guide on Compuserve (page TDG-4), by sending Source Mail to TI9720 on Source, or directly from Asgard. All major credit cards accepted.

Asgard Software

P.O. Box 10306
Rockville, MD 20850

© 1986 Asgard Software

Got no lira? Got no francs? Try your post office or your bank

So you want to order something straight from England, Italy, Canada or Australia.

It's a freeware author or a mom-and-pop software company. Not set up to take American Express, MasterCard or Visa.

You can buy that disk giving the author payment in money he can spend, but it may be a little bit complicated. For instance, if you live in a small town or a suburb, you may have to go a little ways to exchange your money. For instance, if you live in Round Rock,

Texas, you have to go into Austin.

Not all banks there will exchange currency. MBank in downtown Austin offers bank drafts in 21 currencies. You have to pay for it with cash or a cashier's check in U.S. funds, plus the fee which is added on to pay for the service.

Or, for the amount plus \$2, you can buy an international money order at the post office (in Austin, at only the Downtown and University of Texas stations). Not all countries take them—"Pakistan won't"—said a postal spokesperson, but for western, developed nations there is generally no problem.

(By the way, your local bank and/or post office should be able to direct you to the nearest counterpart which deals in international currency).

All the postal money orders go to St. Louis, Missouri, to be converted into the appropriate currency. This adds to the mailing time and is one reason some persons would just as soon pay the higher bank fees.

Ron Becker of the Austin post office noted that, if the person on the receiving end has a problem or if the money order is lost, the person buying the money order can fill out a form 6684 at the post office to check into this. He says this cannot be done until 30 days after the money order is issued to give it a chance to clear.

Persons buying money orders should keep their receipts in case a problem occurs. If you make a photocopy of your receipt, you can send it to the person in the other country.

Becker says that recipients in Guatemala and Nicaragua seem to have trouble cashing U.S. money orders lately.

Reviewed in MICROpendium

1984

February: B-1 Nuclear Bomber, Tandon TM-100 Disk Drive, Void, Beanstalk Adventure, Microsurgeon, On Gaming, Database 500

March: Star Trek, Escape From Balthazar, Garkon's Getaway, Sky Diver, Mail-Call, Prowriter 8510 Printer

April: Monthly Budget\$ Master, Budget Master, Home Budget, Thief, Donkey Kong, Khe Sanh

May: Companion Word Processor, Q*Bert, Mad-Dog I & II, Programs for the TI Home Computer

June: Creative Expressions Accounts Receivable/Accounts Payable, CDC 9409 Disk Drive, Starship Concord, Lost Treasure of the Aztec, ASW Tactics II

July: Theon Raiders, Introduction to Assembly Language for the TI Home Computer, Game of Wit, Pole Position

August: TE-1200, Tower, Galactic Battle, Galaxy

September: Wycove Forth, 99/4 Auto Spell-Check, QUICK-COPYer, Wizard's Dominion, Anchor Automation Mk XII Modem

October: Killer Caterpillar, ZORK I, Defender

November: 9900 Disk Controller Card/Manager, Super Bugger, Transtar 120S printer, Floppy-Copy, Data Base-X

December: Gravity Master, Data Base Manager System, Learning 99/4A Assembly Language ?rogramming

1985

January: Super Sketch, Foundation Computing 128K Card, PTERM-99, TI-Runner

February: Super Extended BASIC, Beginning Assembly Language for the TI, ZORK II

March: Morning Star Software CP/M Card, WDS/100 Winchester Disk Drive, Sketch Mate, BMC Color Monitor

April: 9900 Micro Expansion System, Disk + Aid, Gemini 10X-15X

May: Character Sets and Graphics Design, Draw 'N Plot

June: GRAPHX, DATA BASE I

July: Acorn 99, Advanced Diagnostics

August: Model Dow-4 Gazelle, TI-Artist, PC-KEYS, Not-Polyoptics' Bankroll

September: Midnite Mason, Myarc 32K/128K Card, GRAPHX Companion

October: 4A/TALK, Extended BASIC II Plus, XB Detective, Console Writer 2.1

November: Foundation Z80A/80-column cards, 9900BASIC, Adventure Editor

December: Display Enhancement Package, Triple Tech 1986

1986

January: BITMAC, Starcross

February: Night Mission, Peripheral Diagnostic Module, BA-Writer

March: Super Duper, Tunnels of Doom Editor, Business Graphs 99

April: U.S. Open Tennis, PRBASE

May: 4A Flyer, GRAM Kracker, Artist's Companion

June: Myarc Disk Controller Card, Maximem

July: Horizon RAMdisk, Old Dark Caves, Fun!writer, TI99/4A Macro Assembler

August: JOYPAINT 99, GPL Assembler, TI99/4A INTERN, GPL Linker

September: Mechatronic 128K card

October: TI-Forth Utilities, CorComp Memory Plus

9640 IN CHICAGO—

(Continued from Page 34)

gramming. On the IBM, it's horrendous. On the TI you just CALL LOAD, CALL LINK."

However, when asked about the likelihood of an IBM compatibility card, Phillips said, "Once you have an IBM keyboard like that I think it's down the road a short time from now. Today, though, we're selling 9640s and we want to support that. It's a very powerful and very capable computer."

Holding up the 5 x 7-inch board containing the 9640, Phillips said, "it's the equivalent of an IBM-PC motherboard, it's the equivalent of an EGA

graphics card, it's the equivalent of an MS mouse interface card and it's the equivalent of a Quadram card minus the parallel and serial interface. I think we've done one of the finest jobs in terms of packaging a product in the entire personal computer field."

DOS offers insurance to programmers

In what was described as "a move to develop quality software for the TI99/4A," Disk Only Software (DOS) announced the availability of major medical and life insurance for its programmers.

In an agreement reached with a national medical insurance provider, Blue Cross and Blue Shield, DOS is permitted to provide full medical coverage for

TIBBS board on line in Sacramento area

Jim Goldsberry of Sacramento, California, announces that he has on line a new TIBBS board in the Greater Sacramento area.

The board, "TI'WIRE" supports 300 and 1200 baud and operates 24 hours a day at (916) 685-4068 in Elk Grove, California.

Goldsberry expressed appreciation for support from Ralph Fowler and Woody Large.

its employees working 20 or more hours per week developing software or hardware for the TI99/4A. A life insurance policy is automatically provided for persons joining the medical plan.

"The availability of medical and life insurance will now enable programmers, students and businessmen to take advantage of benefits never before seen in TI cottage industries," said Jeff Guide, president of Disk Only Software. "Besides receiving top royalties, employees will now be able to select an insurance option. In today's world of high medical costs DOS can provide an added incentive to those employed by us," Guide said.

Disk Only Software is looking for qualified programmers and programs that will be marketed in the TI community worldwide, Guide says, adding that DOS provides top royalties for programs developed.

For more information, write to Disk Only Software at P.O. Box 244, Lorton, VA 22079 or call 1-800-446-4462 plus 89735 at the tone (touch tone required) or 301-369-1339. Guide asks that programmers provide information on either programs they have available or their areas of expertise.

**Buying
from
MICROpendium
advertisers
helps keep
the TI market
going strong!**

* SEASON'S GREETINGS from McCann
* Software, makers of Business Graphs 99
* and The Printer's Apprentice for the
* TI-99/4A and dot matrix printers.

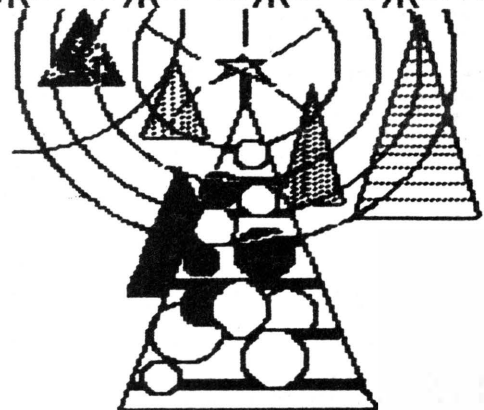
* The Printer's Apprentice assists users
* with all aspects of custom page
* creation: font design, text formatting,
* artwork editing and page layout. Unique
* text handling features include microjusti-
* fication of proportionally spaced
* custom fonts and hyphenation.

* The text formatter accepts TI-Writer files and the artwork editor accepts
* "P" files from artist programs. The Printer's Apprentice requires 32K mem-
* ory, disk system and takes full advantage of the high density of 99/4--Epson
* and Gemini type graphics printers.

* The Printer's Apprentice is priced at \$22.50. In addition, the company's
* Business Graphs 99 is now \$15.95. To order send check or money order to:

McCann Software, P.O. Box 34160, Omaha, Nebraska 68134

This ad produced using The Printer's Apprentice, Copyright 1986 Mike McCann. All rights reserved.



Merry Christmas

Part 3 in a series on computer graphics

Displaying, scaling and moving shapes depends on coordinates

By **DARREN LEONARD**

At the end of last month's article, I promised to provide you with a complete program that incorporated all I have covered to date so you may see how all these things can work together.

The program is 180 lines long and will draw a square on the screen. It will then allow you to change the size or move it around the screen as you please.

Type the program in at this time and be careful that you do not make any typographical errors.

Save it to disk (or cassette) and then type "RUN".

The screen will clear and a menu will appear:

```
1-DISPLAY SHAPE
2-SCALE SHAPE
3-MOVE SHAPE
4-QUIT
ENTER YOUR CHOICE
```

If you select 1 to display shape, the screen will clear and a square will be plotted in the center of the screen with coordinates (20,20) (20,-20) (-20,-20) (-20,20). (See Fig. 4.) The center of the square will be the center of the screen (0,0). Notice that the program connects points in a clockwise manner, starting with point 1 and connecting it to point 2, then connecting point 2 to point 3, etc. Programs of this nature will always connect points in ascending order. The last step connects the last point (in this case No. 4) to the first point, thus completing the square.

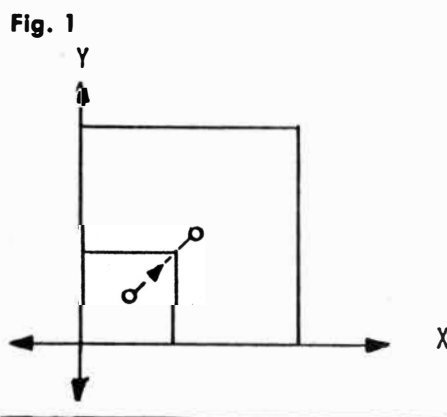
Press any key to return to the menu. This time select 2, for scaling shape. The program then asks you to enter an SF (scale factor). The size of the scale factor determines the size of the shape. For example, if you select $SF = .5$ (which is equal to the fraction $\frac{1}{2}$), the new shape will be one half the length of the old. Thus the new shape will have coordinates (10,10) (10,-10) (-10,-10)

(-10,10). Notice that the center is still at (0,0).

When the menu appears, select 1 to display the shape. A square will then be plotted in the center of the screen. Press any key to return to the main menu. Select 2 for scale shape again, and choose the SF of 3 this time. This will make the length of the new square three times that of the old square and 1.5 times the size of the original square. The new coordinates will be (30,30) (30,-30) (-30,-30) (-30,30) and the center will still be at (0,0). At the main menu select 1 to display the enlarged square.

As long as the center is at (0,0) before you scale the shape, the center will remain at (0,0). However, if the center of the square (or any shape, for that matter) is not at (0,0), the scaling transformation will move the center of the shape a distance proportional to SF.

For example, if the center of the square is at location (X,Y) as in this figure:



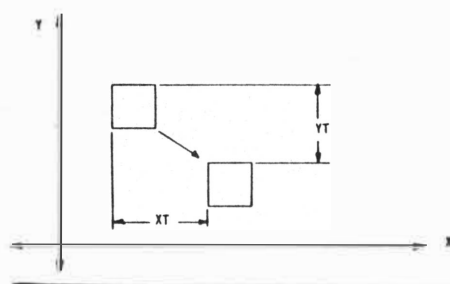
The new coordinate of X will be:
 $X = (SF) * (X^2 + Y^2) * \text{ARCCOS}(X / \sqrt{X^2 + Y^2})$
 and the new Y coordinate will be:
 $Y = (SF) * (X^2 + Y^2) * \text{ARCSIN}(Y / \sqrt{X^2 + Y^2})$

If you are familiar with trigonometry you can prove this to yourself, but

you needn't to maintain continuity.

When you are at the main menu, select 2 and use a scale factor of .333. This will produce a square half the length of the original square. When the main menu reappears, select 3 to move shape. It will prompt you for two numbers, first XT and second YT. In Fig. 3, the square is going to be moved (translated) by the distance XT and YT.

Fig. 2



If XT is positive, the shape will move to the right. A negative XT will move the shape to the left.

A positive YT will move the shape up and a negative YT will move the shape down.

Remember that XT and YT are to be entered in number of pixels you wish to move the shape. Be careful to not exceed the dimensions of the screen.

When you return to the main menu, enter 1 to display the shape at its new position. You can keep moving the shape around the screen by selecting 3 to move followed by 1 to display as long as you like. You may even select 2 to scale the shape, but remember that the center will be translated if it is not at (0,0) to begin with.

When you tire of this, select 4 to quit. Then edit line 200 so that it will read

```
200 N = 3 !NUMBER OF
DATAPOINTS
```

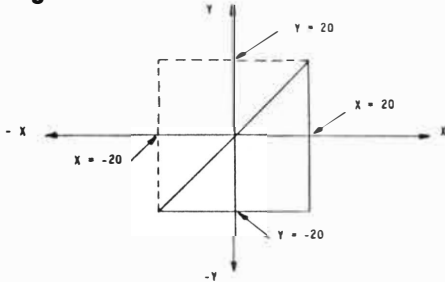
(See Page 39)

DRAW AND MOVE A SQUARE

(Continued from Page 38)

This effectively defines a triangle by eliminating the top left corner of the square. It will be a right triangle with two 45-degree angles. Run the program and select 1 to display the shape. You should recognize it to be the lower right of the square as illustrated in this figure:

Fig. 3



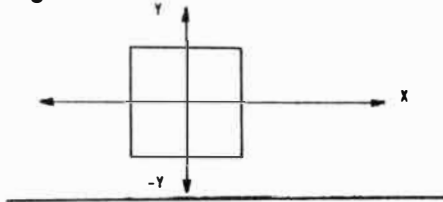
You may scale the triangle if you wish, and you may move it provided $XT = YT$.

Now for an explanation of the program. A copy of last month's article may be helpful here.

Line 140 dimensions the appropriate arrays for manipulation. These are the matrices discussed in the last article. You will notice that for the shapes used in this demonstration the matrices are not used exactly as they were introduced. Since this is a simplified application, you only need to use scalar multiplication and addition. A scalar is a number that is not included in a matrix; e.g. X is a scalar and $X(Y)$ is a vector array. Technically, a scalar has no direction, whereas a vector does. Both have magnitudes. However, understanding of what a scalar is, is non-essential at this point.

Lines 200-240 establish the number of points and the coordinates of these points. Remember that $(0,0)$ is the center of the screen. $A(1,Z)$ is the X -coordinate and $A(2,Z)$ is the Y -coordinate. Thus, the second point will be at $(A(1,2), A(2,2))$ and the third at $(A(1,3), A(2,3))$ and so forth. There are four points, and, if you take a second, might notice that a square is defined. To assist in your understanding, study this sketch:

Fig. 4



Lines 310-330 insert a dummy 1 into the datapoint array. This is not needed in this example, but will be used in more difficult things to come, so for now ignore it, but acknowledge its presence.

Lines 380-460 provide the title screen and the main menu.

It is important to take a second to consider how to handle the data. You could plot a line and store the values for the coordinates for each point on the line and then apply the transformations to each point every time you desire to alter the line or shape. Or, realizing that we need only define the endpoints of a line, and that most shapes without curves can be made by a series of lines, we can do transformations of the endpoints and connect a line between appropriate points using interpolations as discussed in the first article (June 1986).

Not only would this save some time from doing unnecessary calculations, it also produces smoother shapes since each point on the line is determined by approximation as to its closest point to a perfectly straight line drawn through the endpoints, whereas the other method merely transforms the points without regard to fitting them as closely as possible. If this topic interests you, try various lines using both methods and prove it to yourself. However, we will limit our use to interpolation between transformed endpoints exclusively.

Lines 550-660 are used if the user selects to scale the shape. It prompts for a "scale factor" and then scales the shape in both the Y and X directions by the same scale factor. In other words, the shape is intact, but the size is changed. If you desired, you could prompt for two different scale factors,

(See Page 40)

BOWLING LEAGUE MANAGER

* AVAILABLE NOW *

Team Statistics, Bowler Statistics
Substitutes, League Rosters
Mailing Labels, and MORE!

USER FRIENDLY MENUS

REQUIRES

Xbasic, 32K Card, at least one Disk Drive,
RS232 is Optional. Printer is Optional.

\$29.95 plus \$2.00 Shipping

KEN HAYDEN, Ph.D
1111 PARK AVE. 303
BALTIMORE, MD 21201

Try the Checkbook Program
That Works! Buy
ROCKETMAN



Now \$29.95 Requires 1 Disk
Drive, 32K and
Extended Basic. Completely docu-
mented for the new user. Has
SPEED >>> DOC for the experi-
enced user.

California Programs

4104 San Pablo Dam Road
El Sobrante, CA 94803
(415) 222-1626



Have a friend with a TI?
A gift subscription to
MICROpendium lasts all
year, and costs as little as
\$17.

DRAW AND MOVE A SQUARE—

(Continued from Page 39)

SX and SY, and multiply all the X coordinates by SX and all the Y coordinates by SY, thereby distorting the shape as well as changing the size, provided SY is not equal to SX. If you can program in BASIC, you should encounter minimal difficulty altering the program to do this.

After the scaling is done to the endpoints, the new coordinates are stored in the same matrix and control is given back to the main menu.

If the user chooses to translate the endpoints, lines 790-880 are executed. The user is prompted for the translation distances, XT and YT, and the program adds these to the coordinates of each datapoint. This is not a particularly difficult concept, so I will refer you to last month's article and suggest that you study lines 840-870 very carefully. As the endpoint coordinates are translated, they are stored in the same position in the same array, and control is then passed back to the main menu.

If the hacker decides he or she would like to have the shape displayed on the screen, the subroutine at line 900 is called and bizarre things begin to happen.

If you study this subroutine, you will notice that the algorithm for drawing a line, as discussed in article 1, is employed in several different forms. I am not going to explain this subroutine in depth at present since it is very confusing, but will give you an overview.

Basically, it connects the points starting with 1 to 2, then 2 to 3, 3 to 4 and finally 4 to 1. But when it is about to connect to points, it must determine which has greater values and sometimes switches them around (this is why it might start placing dots at 3 to connect to point 2) in order to fit a straight line. As it calculates the coordinates for each point, it calls the subprogram "PUTDOT" and plots that point on the screen, then it finds the next set of coordinates and plots them and so on.

If you are still fuzzy about what the program is doing, I would like to offer

a suggestion that may assist you here as well as in understanding other programs.

Get a few sheets of quadrilateral (graph) paper and a few sheets of ordinary paper. On the graph paper, draw a vertical axis and a horizontal axis so that they meet in the center of the paper (this will be the center of your pre-1880 television). Now, on one other sheet of graph paper, list all of your variables across the top and space them equally. In this example, the top of your paper should have the following variables across the top:

A(1,1),A(2,1),A(1,2),A(2,2),A(1,3),A(2,3),A(1,4),A(2,4),XT,YT,S

Then draw vertical lines down to the bottom of the paper. Now you should have a column for each variable. Now place the current value of each variable in the top of the column. If there is no current value, use a zero. Now follow the logic of the program and with each step of the program use a calculator and determine what the new values of each variable will be. Enter these on the next horizontal row in the appropriate columns. If the program calls for a point to be plotted, use the graph paper with the coordinate axis and plot the points on it. By following the program like this, you should be able to grasp what is going on.

I find that this technique is very useful in writing as well as deciphering complicated algorithms, and I think you will find it a valuable tool as well.

ROTATION

Before we proceed, I would like to remind you that I am assuming that you have an elementary knowledge of geometry and can program somewhat in BASIC.

I also want to remind you that the 99/4A was not intended to be a CAD machine, and I am therefore limited as to what I can show you on this computer. My main purpose of this series is to illustrate *concepts* that will enable you to have a basic idea of how CAD works.

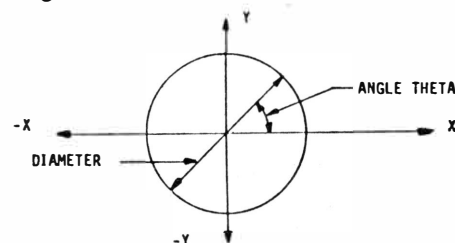
With this in mind, let us enter the realm of rotating a two-dimensional shape. As usual, we must review some

math in order to use rotation.

Rotation is contingent on the sine and cosine trig functions. A simple understanding of these functions is necessary for the remainder of the article, so a brief review follows:

Imagine a coordinate axis with circle of diameter d drawn around it. It would look something like this:

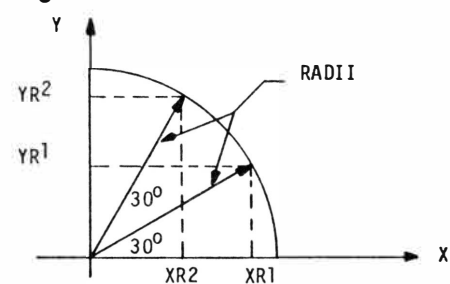
Fig. 5



Remember that the definition of the diameter of a circle is a straight line that connects two points on opposite ends of the circle and passes through the center of the circle. In a similar sense, a radius is a line that connects the center of a circle to any point on its circumference. The length of the radius is always half the length of the diameter and is always a constant for the same circle.

Now take a look at the top righthand corner of a circle with two radii drawn at different angles from the X-axis.

Fig. 6



For the sake of argument, let us say that the length of the radii are one inch. So no matter where on the circle they are drawn, they will always be one inch long.

R1 is at 30 degrees from the X-axis and R2 is at 60 degrees from the X-axis. Examination of the two radii yields that the coordinate distance of X is

(See Page 41)

DRAW AND MOVE A SQUARE—

(Continued from Page 40)

greater for R1 than for R2. Not surprisingly, the coordinate distance along the Y-axis is greater for R2 than for R1.

If you have read part one of this article, you may recall that, by pythagorean theorem,
 $R^2 = X^2 + Y^2$

This means that for a given X, there can only be two values of Y that will give the coordinates of a point on the circle.

Both values of Y will be the same number, but one will be the negative of the other.

As you traverse the circle in a counterclockwise direction starting at the intersection with the positive X axis, a small table of what Y, X and the angle theta are doing:

As theta goes between 0 and 90 degrees, X is decreasing and Y is increasing.

As theta goes between 90 and 180 degrees, Y is decreasing and X is increasing in magnitude in the negative direction.

When theta is going from 180 to 270 degrees, X is increasing to zero (remember it is negative at 180 degrees) and Y is increasing in magnitude in the negative direction.

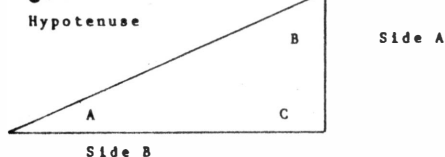
Finally, when the angle is going from 270 to 360 degrees, X is increasing to its maximum value and Y, since it is 0 at 270 degrees, is approaching zero.

You may realize that we need to determine the coordinate values of X and Y if we are to plot our point on the screen. Thus, we are attempting to determine the new values of X and Y for a given angle theta.

Fortunately, the trig functions of Sin and Cos do this with elegance.

Quick review of triangle terminology:

Fig. 7



The hypotenuse is the longest side of a triangle and is opposite of the largest angle. For our purposes, we need the definitions that follow.

SIN(A) is read as the sine of angle A and COS(A) is read as the cosine of angle A.

$$\text{SIN}(A) = \frac{\text{Length of Side A}}{\text{Length of Hypotenuse}}$$

$$\text{COS}(A) = \frac{\text{Length of Side B}}{\text{Length of Hypotenuse}}$$

Looking at the triangle, we will say that Side B is "Adjacent to the angle A" and Side A is "Opposite to the angle A." We will use the following abbreviations:

HYP = length of the hypotenuse

ADJ = length of the side adjacent to the angle

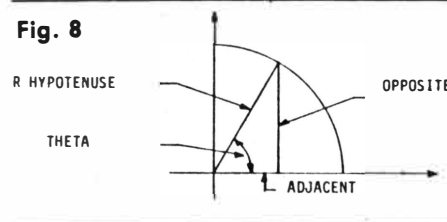
OPP = length of the side opposite to the angle

$$\text{Thus } \frac{\text{OPP}}{\text{HYP}} = \frac{Y}{R} \quad \text{SIN}(A) = \frac{\text{ADJ}}{\text{HYP}}$$

$$\text{and } \frac{\text{ADJ}}{\text{HYP}} = \frac{X}{R} \quad \text{COS}(A) =$$

Before you panic about the Y/R and the X/R look at this illustration.

Fig. 8



Y is really the side opposite of the angle and X is adjacent to the angle. R is the radius and is the hypotenuse of the triangle.

As the angle theta increases, SIN(THETA) increases and Y becomes larger. This is obtained by rearranging the equation to give $Y = R * \text{SIN}(\text{THETA})$. Similarly, $X = R * \text{COS}(\text{THETA})$ and as theta increases, X decreases. Believe it or not, negative signs are taken care of and this is the foundation of

(See Page 42)

SST Expanded Basic Compiler
\$25.00

With Graphics and Text Mode
\$35.00

NEW VERSION

The new compiler system now compiles and loads programs almost 3 times faster (some have been compiled up to 5 times faster).

REVIEW - The Compiler received an excellent rating for performance and documentation in a review in the HOME COMPUTER MAGAZINE, Sept., 1984.

The Compiler translates Basic programs into TMS 9900 machine language. It contains most of the features of Extended Basic plus many others. Requires memory expansion, disk, E/A or MM module.

PRE/SST PROGRAM - \$30.00

Facilitates preparing existing programs for processing by the SST Compiler. Makes developing new programs easier. Requires extended Basic and memory expansion.

Send check or money order or write for information to:
 SST Software, Inc., Box 26,
 Cedarburg, WI 53012

MOVING TO MS-DOS?

MOVE YOUR DATA TOOL! Thanks to Intelpro's advanced software product, PEP, converting data from your TI-99/4A (or any computer) to MS-DOS is as easy as printing it.

PEP, short for "Printer Emulation Package," makes an IBM-PC, XT, AT, or true compatible appear to be an intelligent serial printer. With PEP, if an application on your 99/4A can print, then it can transfer data to your PC. All by itself, without the need to run (or learn about) another piece of software.

Good news—PEP is available right now. And it's deceptively inexpensive: \$59.95 in U.S. funds (\$79.95 Canadian), plus \$5.00 S&H. WRITE or PHONE for our free brochure! NEW ADDRESS:

INTELPRO

13 Saratoga Drive
 Kirkland, Quebec, Canada
 H9H 3J9

Tel. (514)-694-6862

DRAW AND MOVE A SQUARE—

(Continued from Page 41)

our solution. If you have a calculator, plug some value into it using the Sin and Cos functions and see for yourself that this is true. You may use your 99/4A if you prefer, but remember to convert from degrees to radians before

calling the SIN or COS function.

The circle routine in article one may aid in your understanding of this concept, but the best way is to play with some numbers and your computer (or calculator) and prove it.

The rotation procedure will then

construct a temporary radius from the endpoint to the center of the screen and will rotate this point on a circle with a radius equal to the distance of the point from the center of the screen and then reverse the process a bit to find the new X and Y values for the rotated point.

Translation and Scaling

```

100 ! TRANSLATION AND SCALING
110 ! DARREN LEONARD
120 ! 10/17/86130 !
140 DIM A(3,15),TR(3,2),SC(2,2)
150 ! *****
160 ! THIS SECTION DEFINES THE
170 ! CORNERS OF A SQUARE.
180 ! CHANGE THE VALUES TO CHANGE
190 ! THE SHAPE OF THE SQUARE
200 N=4 !NUMBER OF DATAPOINTS
210 A(1,1)=20 :: A(2,1)=20
220 A(1,2)=20 :: A(2,2)=-20
230 A(1,3)=-20 :: A(2,3)=-20
240 A(1,4)=-20 :: A(2,4)=20
250 !*****
260 !THIS SEGMENT PLACES A DUMMY
270 ! 1 IN THE 3RD ELEMENT OF A
280 ! MATRIX.
290 ! USING N AS THE # OF DATAPOINTS300 !
310 FOR PN=1 TO N !LOOP FOR EACH POINT
320 A(3,PN)=1
330 NEXT PN340 !
350 ! *****360 !
370 !REM CLEAR SCREEN AND GIVE OPTIONS
380 CALL CLEAR
390 PRINT "1-DISPLAY SHAPE"
400 PRINT "2-SCALE SHAPE"
410 PRINT "3-MOVE SHAPE"
420 PRINT "4-QUIT"
430 INPUT "ENTER YOUR CHOICE":C
440 IF C<1 OR C>4 THEN 380
450 ON C GOSUB 980,490,710,1400
460 GOTO 380
470 ! END OF MAIN PROGRAM
480 !*****
490 ! SCALING SUBROUTINE
500 ! MATRIX A(2,N) CONTAINS THE CURRENT
510 ! N DATAPOINTS AND WILL BE SCALED
520 ! BY THE FACTOR OF S AND THE
530 ! NEW COORDINATES OF THE DATAPOINTS WILL
540 ! BE PUT BACK IN A()
550 CALL CLEAR
560 PRINT "ENTER SF"
570 PRINT "S<1 WILL DECREASE SIZE"
580 PRINT "S>1 WILL INCREASE SIZE"
590 PRINT "S=1 HAS NO EFFECT"
600 PRINT
610 INPUT "WHAT S?":S
620 FOR V=1 TO N
630 A(1,V)=A(1,V)*S
640 A(2,V)=A(2,V)*S
650 NEXT V

660 RETURN
670 !*****680 !690 !
700 !
710 !*****
720 ! TRANSLATION SUBROUTINE
730 ! TRANSLATES THE COORDINATES OF THE DATAPOINTS
740 ! IN THE MATRIX A BY THE XT AND YT
750 ! AND PLACES THE NEW COORDINATES
760 ! BACK IN A770 !780 !
790 CALL CLEAR
800 PRINT "ENTER DT'S"810 !
820 INPUT "ENTER XT":XT
830 INPUT "ENTER YT":YT
840 FOR T=1 TO N
850 A(1,T)=A(1,T)+XT
860 A(2,T)=A(2,T)+YT
870 NEXT T
880 RETURN
890 !*****
900 !SUBROUTINE TO PLOT THE CURRENT DATAPOINTS
910 !
920 ! PLOT THE N DATAPOINTS IN THE MATRIX A
930 ! AND CONSTRUCT A LINE TO CONNECT
940 ! SUCCESSIVE POINTS BY DETERMINING THE
950 ! SLOPE AND INTERPOLATING
960 ! AS THE COORDINATES FOR EACH POINT ARE
970 ! DETERMINED
980 ! THEY ARE PLOTTED ON THE SCREEN
990 ! BY USING THE PUTDOT SUBROUTINE980 !
1000 CALL CLEAR
1010 FOR P=1 TO N
1020 IF P=N THEN 1070
1030 Y1=A(2,P)
1040 Y2=A(2,P+1)
1050 X1=A(1,P)
1060 X2=A(1,P+1)
1070 GOTO 1110
1080 Y1=A(2,P)
1090 Y2=A(2,1)
1100 X1=A(1,P)
1110 X2=A(1,1)
1120 IF X1=X2 THEN 1220
1130 IF Y1=Y2 THEN 1290
1140 SLOPE=(Y2-Y1)/(X2-X1)
1150 B1=INT(MIN(X1,X2))
1160 B2=INT(MAX(X1,X2))
1170 FOR X=B1 TO B2
1180 Y=INT(SLOPE*X+.5)
1190 FJ=X :: GJ=Y
1200 CALL PUTDOT(FJ,GJ)
1210 NEXT X
1220 GOTO 1360

```

(See Page 43)

TRANSLATION AND SCALING—

(Continued from Page 42)

```

1220 C1=INT(MIN(Y1,Y2))
1230 C2=INT(MAX(Y1,Y2))
1240 FOR ZZ=C1 TO C2
1250 Z=ZZ
1260 CALL PUTDOT(X1,Z)
1270 NEXT ZZ
1280 GOTO 1360
1290 D1=INT(MIN(X1,X2))
1300 D2=INT(MAX(X1,X2))
1310 FOR ZX=D1 TO D2
1320 OP=ZX
1330 YT=Y1
1340 CALL PUTDOT(OP,YT)
1350 NEXT ZX
1360 NEXT P
1370 CALL KEY(O,K,S):: IF S=0 THEN 1370
1380 RETURN
1390 STOP
1400 END
1410 SUB PUTDOT(V,Q)
1420 X=Q :: Y=V :: IF X<-125 OR X>125 THEN
1730
1430 IF Y<-95 OR Y>95 THEN 1730
1440 X=(95-X):: Y=INT(Y+125)
1450 IF C=0 THEN C=143
1460 W=INT((X-1)/8)+1 :: Z=INT((Y-1)/8)+1 ::
: X1=X-((W-1)*8):: Y1=Y-((Z-1)*8):: CALL GC
HAR(W,Z,A):: A1=A :: IF A<32 THEN A=32 :: A
1=32
1470 CALL CHARPAT(A,A$):: P=X1*8-B+Y1 :: Q=
INT(P/4.06)+1 :: IF Y1>4 THEN Y1=Y1-4
1480 IF A<>32 THEN C=C+1 ELSE A=C :: IF C<3
4 THEN 1720
1490 B$=SEG$(A$,Q,1):: B=ASC(B$):: IF B<65
THEN B=B-47 ELSE B=B-54
1500 ON B GOSUB 1560,1570,1580,1590,1600,16
10,1620,1630,1640,1650,1660,1670,1680,1690,
1700,1710
1510 D$=SEG$(C$,Y1,1):: IF D$="1" THEN IF A
1=32 THEN 1730 ELSE 1720
1520 B=B+2^(ABS(Y1-4))
1530 ON B GOSUB 1560,1570,1580,1590,1600,16
10,1620,1630,1640,1650,1660,1670,1680,1690,
1700,1710
1540 A$=SEG$(A$,1,Q-1)&B$&SEG$(A$,Q+1,16-Q)
1550 CALL CHAR(A,A$):: CALL HCHAR(W,Z,A)::
GOTO 1720
1560 C$="0000" :: B$="0" :: RETURN
1570 C$="0001" :: B$="1" :: RETURN
1580 C$="0010" :: B$="2" :: RETURN
1590 C$="0011" :: B$="3" :: RETURN
1600 C$="0100" :: B$="4" :: RETURN
1610 C$="0101" :: B$="5" :: RETURN
1620 C$="0110" :: B$="6" :: RETURN
1630 C$="0111" :: B$="7" :: RETURN
1640 C$="1000" :: B$="8" :: RETURN
1650 C$="1001" :: B$="9" :: RETURN
1660 C$="1010" :: B$="A" :: RETURN
1670 C$="1011" :: B$="B" :: RETURN
1680 C$="1100" :: B$="C" :: RETURN
1690 C$="1101" :: B$="D" :: RETURN
1700 C$="1110" :: B$="E" :: RETURN
1710 C$="1111" :: B$="F" :: RETURN
1720 C=C-1 :: IF C=0 THEN C=1
1730 SUBEND

```





The HORIZON RAMDISK

\$53* PC Board, Manuals & Software
\$45* Five or more boards with one manual and set of disks.

* PARTS AVAILABLE ELSEWHERE FOR ABOUT \$100/720 Sector
* OHIO RESIDENTS ADD 5.5% SALES TAX

NOT JUST ANOTHER RAMDISK...

THE ONLY BATTERY-BACKED RAMDISK for the TI-99/4A. The on-card batteries recharge when you operate your computer. The batteries will last for years and the entire 192K RAM memory is battery-backed including the DSR RAMDISK Operating System.

THE ONLY FULLY OPEN PE-BOX CARD. The Horizon RAMDISK contains no EPROM or ROM. The DSR Operating System is in RAM and is loaded from a floppy disk. DOCUMENTED SOURCE CODE is provided for those who wish to understand AND MODIFY the Operating System.

THE ONLY PERIPHERAL WITH DSR RAM which allows the assembler language programmer to write Device Service Routines. The Horizon RAMDISK memory is decoded entirely within address space >4000 to >5FFF. A special loader (provided with SOURCE CODE) enables AORG Editor/Assembler object files to be placed in the RAM on the card. You can write all new CALL subprograms for TI BASIC, power-up and interrupt service, and DSR routines making use of the 192K battery-backed RAM. >4000 to >5FFF is always enabled, and the remaining 186K is paged in 2K at a time in >5800 to >5FFF with the LDCR instruction.

THE ONLY RAM CARD YOU CAN BUILD your self at substantial savings over fully constructed models. You can buy the printed circuit board, user's manual, Operating System software, and an ILLUSTRATED step-by-step construction manual with schematic and parts list and get the parts wherever you can find the best deals. Hundreds of TI Enthusiasts have built the Horizon RAMDISK. If you've had any experience building electronic kits you can too — at SIGNIFICANT SAVINGS! (If you want a fully constructed, tested and warranted unit, we sell those too.)

CONSTRUCTED - 90 DAY WARRANTY

192K - 720 Sector \$210
104K - 360 Sector \$165

EASY TO USE...

- > Functions just like a TI floppy drive, only FASTER! Load the operating system with a single key press, then access the RAMDISK as you would a floppy disk
- > Compatible with software using standard DSR/LNK including sector copy, Disk Manager II, MG Explorer, TI Writer, TI Multiplan, and Editor Assembler. Compatible with TI BASIC, TI Extended BASIC, TI and Wycoff FORTH, TI LOGO, and Assembly Language
- > Comes with the DM-1000 Disk Manager. Loads from BASIC of Ext BASIC in 1 second with CALL DM.
- > Compatible with existing hardware including MAXIME M, Gram K'racker, and the RAM/GRAM Card.
- > Accepts drive names from DSK1 to DSK6.
- > DIP switch sets CRU Base from >1000 to >1700.
- > Adds CALL Subprograms to BASIC to: 1) set the drive number, 2) set write protect, 3) set maximum sectors, 4) enable DSR for direct access, 5) execute M/L code from BASIC. DELETE "XBCALL" downloads CALLs to low BK for execution from running Ext BASIC programs
- > Comes with complete DSR SOURCE CODE. Explains how to write A/L CALL routines to enhance TI BASIC.

HORIZON COMPUTER LIMITED
P.O. Box 554
Wilmington, Ohio 43465

JOY PAINT

(C) Copyright 1986

Sophisticated. Easy to use.



These graphics and hundreds more included !!

Rated 'A' By MICROpendium

Requires: TI 99/4a, 32k, Disk Drive, Joystick, and one of the followings: Ed/Assm, Ex-Basic, Mini-Memory, or TI-Writer. \$39.95 Postpaid.

GREAT LAKES SOFTWARE

804 E. Grand River Ave.
Howell, MI. 48843

THIS ADVERTISEMENT WAS CREATED USING JOY PAINT 99!

Submarine commander

A maritime challenge

By JOHN KOLOEN

As Submarine Commander it is your responsibility to guide your submarine under an ocean to seek out and destroy convoys of enemy ships. But don't think the enemy won't fight back, its convoys protected by destroyers just waiting to ram your submarine or send you to the bottom in a barrage of exploding depth charges.

This game was released for the TI about mid-year but has been available on other machines for a couple years. It combines colorful graphics and realistic sound into an entertaining strategy/action game that is filled with ups and downs, or submerging and surfacing. (Distributors include Tenex Computer Express and Arcade Hardware of Manchester, England.)

Performance: This game can take a long time to play—more than an hour is not unusual. Impatient types may find it frustrating. Despite this, a lengthy game is not necessarily indicative of a successful game. Scores are based on the amount of enemy tonnage sunk and whether you are able to sink all the convoys at the given skill level (there are three levels of play). Points are deducted depending on the number of torpedoes used (there is a finite number available), amount of fuel used (also finite), the amount of damage incurred (it can be repaired) and whether you are destroyed (which can be the result of running out of oxygen, being hit repeatedly by enemy depth charges or deck fire, having the hull crushed by descending to an excessive depth, etc.). There are actually a lot of ways to lose, and only one way to win—by sinking every enemy convoy.

Submarine Commander uses four screens or views: the main control panel, a sonar view, a view of the surface through a periscope and a map depicting your position relative to land and convoys. The main panel includes numerous readouts reporting depth, position, fuel and battery status,

Review

Report Card

Performance	A
Ease of Use	A
Documentation	B-
Value	A
Final Grade	A

Cost: \$29.95 (disk includes Submarine Commander, Computer War and River Rescue)

Manufacturer: Thorn EMI

Requirements: console, monitor or TV, memory expansion, disk system, Extended BASIC, Editor/Assembler or Mini-Memory, joystick optional

speed, etc. Damage indicators are used to gauge the condition of the hull, engines indicators, controls and instrumentation. In the sonar view, the screen is filled with a sonar screen that depicts the position of enemy ships relative to the submarine. The periscope view shows the ships on the surface. It can be used only at depths of less than 40 feet. The map is used as an aid in stalking or avoiding convoys,

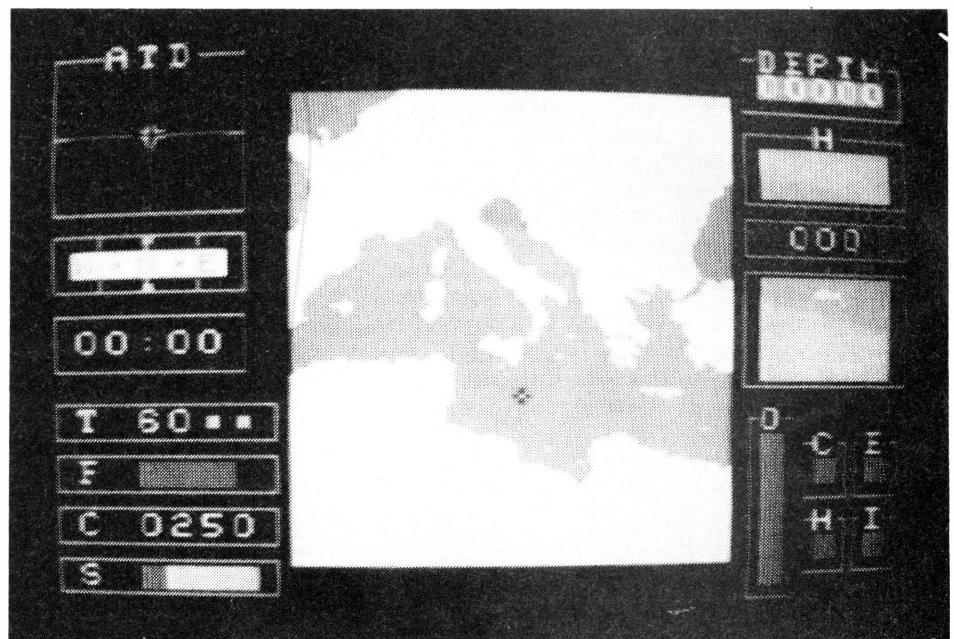
providing a long-range view of the battleground. One may toggle between these various screens often and rapidly.

Sound is used to good effect in simulating the sound of sonar, and depth charges. Not only do you hear the depth charges explode, but you hear them as they enter and descend through the water toward the submarine.

As commander of the submarine you control the speed of the vessel, its heading and depth. The longer you remain on the surface, the stronger your batteries become and the faster damage is repaired. While submerged you must keep a close eye on the amount of oxygen remaining, among other things.

Part of the reason I found the game to be engrossing is the wealth of details one has to keep aware of. It's not enough to track convoys, you have to chase them. Even then, they may seek refuge in a harbor and even trap you if you follow them in. Often, you will find yourself under fire from one vessel while attacking another, giving you just enough time to release one torpedo before crash-diving to avoid being sunk. If the enemy scores enough hits

(See Page 47)



PEP

Transferring files to Brand X

By JOHN KOLOEN

The Printer Emulation Package (PEP) by Intelpro is not the type of software that one would buy without having a specific use for it. First of all, the user must have at least a PC clone and, preferably, another computer brand that does not use the same operating system as the PC, such as a TI99/4A. If you do not have these things, you would have no use for PEP. Having them, however, may well mean that you *must* have a PEP.

PEP's sole reason for existing is to support the transfer of data from one computer system to another. It may be from a PC to a TI99/4A, or vice versa. Or from some other computer brand to a PC. It doesn't matter, just as long as a PC is involved. (The PEP program is loaded into the PC running PC DOS 2.0 or higher.) What PEP does is make a PC look like a printer to the other computer.

There are many situations in which data transfer between otherwise incompatible microcomputers is useful. Suppose you use a PC at the office and a TI at home. Suppose you take some work home from the office, do it on the TI. What then? You could transfer it to the PC using a modem, or you could put a TI next to the PC, connect the two with a cable linking RS232 ports, and run the PEP program. This type of straight data transfer may also be done via modem, but PEP also allows you to design your own drivers to send selected data from, say a database.

Performance: I used PEP to send several databases from my TI to a PC clone. I sent one database without changes from the TI to the PC without incident. I also sent various other ASCII files generated by TI-Writer and Intelpro's other product, Companion.

Then I decided that since I was transferring a database to an entirely different system that I would change the order in which the data fields were

Review

Report Card

Performance	A
Ease of Use	A
Documentation	A
Value	A
Final Grade	A

Cost: \$59.95 + \$5 S&H

Manufacturer: Intelpro, 13 Saratoga Dr.; Kirkland, Quebec, Canada, H9H 3J9

Requirements: IBM-PC, XT or AT clone with RS232 port, RS232 interface cable, TI99/4A console, monitor or TV, expansion memory, disk system and RS232 interface

displayed. To make things more productive, I decided not to utilize all the fields that were entered on my TI. I did this by writing a short driver in Extended BASIC, specifying the order in which I wanted the data to appear and then which fields I want to transfer. This all worked without a hitch, except

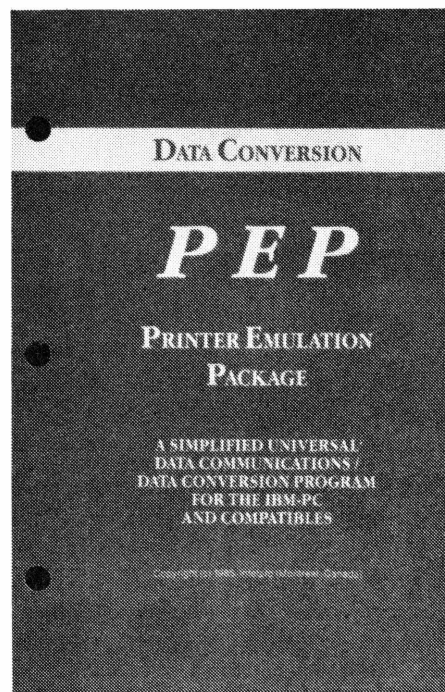
for the time I spent debugging the driver.

I won't bother going into the mechanics of its operation, since it runs out of a PC. Suffice it to say that I found it so easy to use that I still wonder why Intelpro produced a 100+ page manual to describe it. At first I was intimidated by the manual, but putting it aside I was able to run the program simply by loading the program in the PC, connecting the cables and following the menu prompts. Intelpro's Companion is equally easy to figure out, though it too comes with a detailed and lengthy manual.

Ease of Use: After purchasing an RS232 cable I spent a few hours locating a gender changer so that I could plug one end into the TI and the other into the PC. Having set the manual aside, I loaded the program and started transferring data from the start. While the manual includes a section on PEP's use with the TI, I found it to include more information than I needed about cabling and such. As noted above, I bought an off-the-shelf cable and an off-the-shelf gender changer and had no problem in this area.

Documentation: The word "superb" comes up at this point. Allan Swett, author of PEP and Companion, produces virtually perfect manuals for his software. If you've got a question, the manual will have the answer, somewhere. Although there is no index in the PEP manual, there is a very good table of contents. The manual is professionally typeset and printed and is prepunched for a three-hole binder. It is conveniently sized—8.25 x 5.25 inches. If you read the entire manual you will no doubt learn a lot about data transfer, but the beauty of the program is that you don't have to read the manual to use it.

Value: I've had calls from readers of (See Page 47)



MAX-RLE

For downloading graphics

By **ROBERT CARMANY**

The first thought that went through my head when I heard of "MAX-RLE" was: 'What in the word is an RLE?' After reading the documentation that came with the program, I still don't really know except that it stands for "Run Length Encoded" which describes graphics files (or screens) that seems to be everywhere on electronic bulletin boards.

MAX-RLE is a VIDTEX terminal emulator that allows the user to display these impressive graphic files after they have been downloaded to disk. The pictures resemble the facsimile photos that appear in your newspaper, and are composed of a series of single pixel dots. The documentation warns that these files should be downloaded using the XMODEM protocol.

The program is very simple to operate and the instructions are equally easy to follow. The program loads from either Editor/Assembler Load and Run or the same option from the Funlwriter Utility menu. Simply type DSKn.MAX-RLE and you are in business.

You are then presented with the title screen from which there are three options. FCTN = will, of course, exit the program. If you type in DSKn., the program will catalog the appropriate disk drive (you return to the title screen by pressing enter.) Alternatively, you may display an RLE file by typing in the filename, such as DSK1.HORSE.

MAX-RLE will load and display files in any of four different formats: Display/Fixed 128 RLE files, Display/Variable 80 RLE files, screens created with GRAPHX and screens created with TI-ARTIST Version 2.0. It is not necessary to type in the "_P" or "_C" that are seen on the catalog

Review

Report Card

Performance A+
Ease of Use A+
Documentation A
Value A+
Final Grade A+

Cost: Freeware (available as a public domain program on electronic bulletin boards and from user groups)

Author: Tom Watford

Requirements: Console, monitor or television, disk system, memory expansion, Editor/Assembler or Funlwriter, printer optional but strongly recommended.

with TI-ARTIST files—they are loaded automatically if they are present.

Now that you have the picture on the screen, what do you with it? If you press enter, you will be returned to the MAX-RLE title screen to load another

picture. If you press "P," the default printer prompt for Epson/Gemini-type printers appears. If your printer doesn't fit these specifications, just enter your printer parameters at this point. Pressing enter then dumps the picture to your printer.

The last option is by far the most powerful. If you press "S" for save, you are presented with the choice of saving the picture *to any one of four formats!* The first choice is GRAPHX, the second TI-ARTIST, the other two are Display/Fixed 128 and Display/Variable 80 files. So, all you have to do is type in DSKn.FILENAME, and that's it.

This last option is of great significance because it gives you virtually unlimited access to graphics files. Those with GRAPHX can now convert TI-ARTIST files so that they can be displayed, altered or enhanced using GRAPHX. All you have to do is load the file in its TI-ARTIST format and save it in GRAPHX format. It works like a charm.



Brian Patrick Malverty

Age: 26
 Born: June 3, 1959
 New York, NY
 Height: 5'10"
 Weight: 180 lbs
 Build: Medium
 Eyes: Brown
 Race: White
 Hair: Brown
 Complexion: Med.
 Nationality: AM.

Reportedly has
 appendectomy
 scar and has
 been known to
 wear an earring.

SUBMARINE—

(Continued from Page 44)

before you are able to submerge to the relative safety of the ocean's depths, you may find yourself in a waiting game, your engines and controls virtually unusable, your oxygen supply diminishing and the convoy hovering above you, visible as blips on the sonar screen.

Ease of Use: Rudder control, surfacing and diving may be controlled by a joystick or from the keyboard. All other functions are controlled by the number keys. The game comes with a keyboard template for reference. There is also a "pause" key for those times when you need a break from the tension of submarine warfare.

Documentation: The manual consists of two pages of compact print. It contains the essentials, and that is all. Much of what you need to know about playing the game, such as how to interpret the hydrophone chart, will come through trial and error.

Value: I enjoyed playing this game when I received it and continue to play it periodically. I am particularly enamored of the strategy that must be considered before launching an attack on an enemy convoy, the stalking that has to be done and the fact that patience may be your best ally.

What makes Submarine Commander a great deal for game players has nothing to do with the game itself. It's in the packaging. True, you get Submarine Commander, but included on the disk are Computer War and River Rescue, both of which are well-designed and entertaining games.

PEP—

(Continued from Page 45)

MICROpendium asking for advice on the cheapest way to transfer data from one computer to another. Most of this involves computers at work and in many cases the brands are not TI. In some cases, they quote prices of \$1000 or more to have it done by a data conversion specialty firm. I see no reason

why even a relatively casual hobbyist shouldn't be able to do much the same thing with PEP with most ASCII files. In this regard, planning how you want the data to appear after the transfer is important and is the reason creating a custom driver for the TI end of the transfer is important. For example, some database programs may require a linefeed, carriage return or other control character at the end of each field or record. This is best done during the transfer rather than after (which is why you should know what program will be using the data after the transfer and what its requirements are in terms of reading the transferred data). Whether additional massaging will be needed will depend on the destination program's ability to convert or utilize data produced by other programs. As a general rule, the more proprietary the destination program is the more likely that the data transfer/conversion process may bog down.

PEP isn't going to help much in terms of transferring programs from the TI to a PC. The various TI programming languages and operating system are so different from languages used on PCs and the PC DOS operating environment that it would be faster and easier to rewrite them from scratch than to attempt to transfer them. There may be exceptions to this, but I am not aware of them.

But for those whose data conversion requirements involve the transfer of files created by word processing, database and other applications software, PEP should fill the bill.

Fort's User Group meets in Indiana

The Fort's User Group of Fort Wayne, Indiana, formerly the Micro 99'ers User Group meets at 7:30 p.m. the second Sunday of each month in Fort Wayne's Shawnee Branch Library.

For further information, write the group at 5319 Twilight Lane, Fort Wayne, IN 46835.

COMPLETE BBS SYSTEM
\$110.00

The most complete bulletin board system written for your TI home computer.

**INCLUDES 3
TRANSFER PROTOCOLS**

1. TELI
2. MODEM
3. ROM/NOFF

TOTAL SYSOP CONTROL

Sysop see the board run as if he was the user. He can override any user input and guide him on the use of the board.

CALL THE BBS AT
(312) 766-2797
or write
BBS SYSTEM
1411 N. 36TH
MELROSE PARK IL.
60160

**EXPAND TO
RGB**

The TI-99/4a is the only Home Computer capable of being upgraded to professional quality RGB display. DIJIT Systems is offering you that capability.

- Experience bright sharp graphics in TI's palette of 16 computer generated colors.
- Reduce eyestrain with text so sharp you can even read the 64 column Forth editor clearly and distinctly.
- Eliminate "rainbow" color bleed distortion and annoying screen interferences from outside sources.

The easy RGB conversion requires:

1. MODEL 4A DECODER INTERFACE	From \$65
Varies according to monitor.	
2. CONSOLE CONVERSION KIT	\$35
Not required for overseas PAL consoles.	

An ANALOG RGB monitor is needed to display the full color range, preferably 80 column rated.

SANYO DMC 6500/7500; SEARS 4084	\$15
ANALOG RGB CONVERSION KIT	

We have super deals on monitors. Send for our list of recommended models and prices.

OTHER DIJIT Systems PRODUCTS

MONITOR ALIGNMENT SOFTWARE	\$20
Creates test patterns for monitor and TV alignment.	
CACHE CARD	\$35
Our own version of "supercart".	
MINI MEMORY LITHIUM CELL	\$5
Exact replacement battery.	

For RGB CONVERSION KIT include \$4.00 S/H. CA. Residents include 6% sales tax. Send check or money order only.

To order or for information
Write to:

DIJIT Systems
4345 HORTENSIA STREET
SAN DIEGO, CA 92103
(619) 295-3301

Newsbytes

New England Faire set for second year

The second annual New England 99 Faire will be held April 4 in the Boston area.

Incentives will be offered for paid registration prior to Jan. 1, the organizers say.

The Faire is sponsored by 99 UNITED, an affiliation of six New England user groups totalling more than 1,000 members.

For further information, write the Boston Computer Society, TI99/4A User Group, One Center Plaza, Boston, MA 02108; call Peter Hoddie at (617) 861-8733 or Walt Howe at (617) 692-2702; or leave a message on CompuServe to 70277,3530, on GENie to WALT.HOWE or on The Source to TI3854.

New Jersey TICOFF set for second year

The second annual Texas Instrument Computer Owners' Fun Fest is scheduled for March 28 at Roselle Park High School in Roselle Park, New Jersey.

Admission is \$5 and a free disk of utility software is offered with advance ticket purchase.

Checks for advance sale tickets are payable to Roselle Park High School Student Council and should be mailed, along with a self-addressed stamped envelope, to Bob Guellnitz, 185 W. Webster Ave., Roselle Park, NJ 07204.

Vendor tables are available for \$50 for the first table and \$35 for each additional table. Electricity is limited at the site, so priority will be given to early applications, according to Art Byers, TICOFF coordinator.

A 10 percent late charge will be added to vendor applications postmarked after Jan. 31.

An exhibit can be covered by proxy for vendors who are unable to attend in person. An additional charge will be made for this service.

Proceeds from the TICOFF go to the

scholarship fund of the Roselle Park High School Student Council.

For further information, contact Byers at (914) 528-5402 or Guellnitz at (201) 382-5963; or call the TICOFF BBS at (201) 257-2607, CompuServe E-Mail 73547,2014 or GENie Mail TICOFF.

Millers Graphics, MICROpendium cited

Millers Graphics and MICROpendium have been awarded the first two Front Range 99er Outstanding Support Awards.

The award was recently established by the officers' council of the users group, which is located in Colorado Springs.

Joe Nuvolini, president of the Front Range 99er Computer Club, said the awards are "to individuals, groups or companies which have provided outstanding support to the TI99/4A community."

The awards consist of engraved brass plaques mounted on wood.

In his letter to Millers Graphics, located in San Dimas, California, Nuvolini wrote, "Gram Kracker is an outstanding piece of hardware and your software contributions Advanced Diagnostics, Explorer, DISKASSEMBLER, and the like allow our orphaned computer to continue as a viable member of the home computer community."

His letter to MICROpendium called it "the best publication ever printed for our orphaned computer."

Fairsoft closes, but BasicSort available

Andreas Dessoff reports that "for various reasons of both a personal and a business nature I have decided to abandon the Fairsoft Inc. venture and the commercial distribution of the BasicSort program for the TI99/4A.

He says, however, that he will distribute the program "using a slightly modified Fairware concept.

He says he will send a copy of the program disk (containing the program and the documentation ready to be printed via TI-Writer/Formatter) to anyone who send him a check for \$3 to pay for a disk, mailer and postage. He says he will not make copies on disks sent in or answer requests for the program not accompanied by a check.

Dessoff authorizes and encourages all individuals to obtain copies of the program from other persons. He also authorizes and encourages uploading to and downloading from any non-commercial bulletin board or communications system.

He maintains the copyright on the program and expressly denies permission in any manner that involves a commercial transaction or the charging of a fee for the program or its duplication. He says he does not authorize the uploading to or downloading from of the program from such networks as CompuServe, The Source or Delphi, and expressly deny such networks the right to make the program available for downloading by their users.

Dessoff makes the latter restriction because "in my opinion the Fairware concept should be of advantage to software authors and software users, but should not be a means for third parties to make money of an author's work without compensating the author."

He says he has returned all checks he has already received from potential purchasers of the program with a free copy of the program disk, and asks all satisfied users of the program to send him a check for \$10.

For further information, contact Dessoff at 1041 Church Hill Road, Fairfield, CT 06432 or (203) 374-3379.

Tex-Comp announces Graphx upgrades

Tex-Comp announces that "by special arrangement with the Australian manufacturer," all Graphx programs sold by Tex-Comp after Oct. 15, 1986, will be equipped with a new high speed

(See Page 49)

Newsbytes

(Continued from Page 48)

loader and a new Flip and Rotate command, which, according to Jerry Price, vice president of Tex-Comp, "greatly increases the flexibility and capability of this already great program.

Price says current Graphx owners can obtain this upgrade with documentation by sending the original disk (only) and \$5 to Tex-Comp, P.O. Box 33084, Granada Hills, CA 91344.

Asgard releases Font Writer software for TI

Asgard Software announces a product it says is comparable to Printshop and Newsroom for Apple, Atari and Commodore computers and to Fontrix on the IBM PC.

Font Writer by J. Peter Hoddie, (author of Pre-Scan It! and system software for the Myarc Geneve computer) is said to combine any TI-Writer text files, TI-Artist or CSGD fonts and TI-Artist pictures the way the user desires.

Font Writer contains several programs. The first program in the package is Font Editor—a program said to allow the user to edit existing TI-Artist or CSGD fonts, or create new ones from scratch. Font Editor contains an editing window and menu-selectable utilities and supports user-defined macro drawing commands for drawing often-used figures with a single command, according to the manufacturer, who says it also allows the user to edit TI-Artist instances and slides.

The Text Formatter program accepts standard TI-Writer files with virtually every imbedded text formatting command supported by TI-Writer, along with many new such commands for graphics support, to allow the user to integrate text fully with graphics easily, according to the manufacturer. Text Formatter is said to accept new commands for printing text in different fonts, including pictures and other graphics, and more.

The last program in the Font Writer package is an organization tool for graphics files designed for ordering and maintaining TI-Artist fonts, slides, instances and pictures.

Font Writer requires Extended BASIC, 32K and a disk drive system. TI-Writer and TI-Artist are recommended.

Documentation by Walter Howe is included. Font Writer is available for a suggested price of \$24.95 from official Asgard Software dealers, from Teledata*Guide on Compuserve (page TDG-4), by sending Source Mail to TI9720 on Source, or directly from Asgard Software, P.O. Box 10306, Rockville, MD 20850. All major credit cards are accepted.

CSGD III released

Character Sets and Graphic Designs III, by Dave Rose, has been released by Texaments.

According to the manufacturer, CGSD III offers four new graphic printing capabilities to the TI99/4A user.

Steve Lamberti of Texaments says a letterhead feature allows a user to create custom-designed letterheads and stationery, using the top and/or bottom of the page with various fonts and small graphics. Letterheads can be saved to disk for later use.

Custom-designed graphic labels can be created using different fonts, small graphics and borders, he says. He says any number of labels can be printed at the user's option and labels can be saved to disk.

Lamberti says signs, T-shirt transfers and "other message-oriented items" can be printed using various fonts and small graphics.

Another feature is Docuprinter, said to print TI-Writer generated files in any one of six full graphic character sets. The user is said to be able to choose between six and eight lines per inch vertically, to add page numbers, to print multiple file documents, to set top and bottom margins, to set tabs and to

print in two-column format. The manufacturer says a special typewriter mode allows a user to type a line of text in the specified character set one line at a time.

The three-disk package comes complete with 25 fonts, 40 small graphics and more than 24 pages of documentation for \$17.95 plus \$1.50 shipping. CSGD III requires a disk system, 32K memory expansion, TI Extended BASIC and either an Epson or Pro-writer compatible printer (specify when ordering).

Lamberti says that since CSGD III is a continuation of the CSGD series, all previous fonts and small graphics are compatible with it.

Diagnostic software mailout limited

Part of information furnished by another TI spokesperson and published in the August MICROpendium was incorrect, according to Jeffrey Crump of TI.

Crump says that TI will not send the diagnostic software it has placed in the public domain to new users groups. He says TI sent out letters for confirmation to groups it had on its list and these groups are the only ones to receive the software. He says that the groups are encouraged to share the software with any newly formed groups.

He emphasizes that TI will not support the software now that it is in the public domain.

He says any new users groups can receive a start-up kit from TI. For further information, contact TI-Jeffrey Crump, P.O. Box 53, M/S 5828, Lubbock, TX 79408.

Flight simulator set for January release

Not-Polyoptics software company has announced the imminent release of a new, all machine language flight sim-

(See Page 50)

Newsbytes

(Continued from Page 49)

ulation called "SPAD Flight Simulator."

The manufacturer says the program is set in World War I France and includes full-screen line graphic views in 3-D perspective, a 360-degree panorama of the area while in flight, mathematical algorithms of the physics of flight for complete acrobatic control of the plane and a battle mode for the expert pilot. *

"SPAD" is scheduled for release Jan. 1, and will be available from Not-Polyoptics at a retail price of \$29.95. The program requires a disk drive, the Editor/Assembler cartridge and a 32K memory expansion card.

For further information or to order, contact Not-Polyoptics, P.O. Box 4443, Woodbridge, VA 22191 or (703) 491-5543.

'Orphan' handbook

The "Orphan's Survival Handbook" by Ron Albright, described as "the one-stop information source for the TI user," has been published by Disk Only Software.

Albright is author of "The Orphan Chronicles," published by Millers Graphics, a history of the development and subsequent abandonment of the TI99/4A by Texas Instruments and events occurring afterwards.

The "Orphan's Survival Handbook" is described as an anthology of material gleaned from hundreds of user group newsletters and hundreds of hours of downloaded files from bulletin board systems.

The "Orphan's Survival Handbook" contains more than 200 pages of TI material, including

schematics, hardware hacks, programs, tips, and tutorials from across the country, as well as original material from numerous sources. The manual is looseleaf and three-hole punched for placement in a binder, and allows for insertion of updates planned for registered owners.

For further information, contact Disk Only Software (DOS), P.O. Box 4170, Rockville, MD 20850; (301) 369-1339 or 1-800-446-462 plus 897335 at the tone (touch tone required). Projected retail price is \$16.95.

Newsbytes is a column of general information for TI99/4A users. It includes product announcements and other items of interest. The publisher does not necessarily endorse products listed in this column. Vendors and others are encouraged to submit items for consideration. Items submitted will be verified by the staff before inclusion and edited to fit the Newsbytes format. Mail items to: MICROpendium, P.O. Box 1343, Round Rock, TX 78680.

User Notes

MDMS Level III gets better

Dr. Eric W. Bray, of Philadelphia, PA, writes:

There are several disk managers available for the TI99/4A. One of the best is Myarc Disk Manager Supreme Level III. This program allows you to format your disks in 9, 16 or 18 sector formats. However, it doesn't have one needed feature: being able to do box formatting. (DM1000 has box formatting but not 18 sector formatting.)

I've come up with a solution to the problem of box formatting disks in the 18 sector format using the Myarc manager. The method is very simple. All you need is the Masscopy program and then do the following procedure:

Format your disk using the Myarc manager. Then leave the manager using the Load/Run option to run Masscopy. You can now format the rest of your disks by having Masscopy to copy your recently formatted disk. Masscopy will copy only about seven sectors and be ready for the next disk.

You can do an entire box in very little time using this method.

Mini-Memory tape copies easy to do

Making copies of Mini-Memory cassettes is a snap, according to Robert C. Woitkowski. Writing in TRACE, the newsletter of MAGNETIC, a Massachusetts user group. He writes:

Last year a question was asked by a member about how to make copies of Mini-Memory cassettes without using two cassette recorders. There is a simple way of doing this.

First, select '3' for Mini-Memory and press 3 again to reinitialize the module. Next, press FCTN= to quit and select '2' for Easybug. Press any key to erase the command screen. A question mark should appear. Type S7000 and hit enter. The prompt "TO?" should appear. Enter 7FFF. Now follow the instructions on the screen for using a cassette recorder. When the tape is complete, you will have a copy of the original tape.

The same process applies to copying disks to cassette except that you must select option 1, Load and Run, to load the original program. Then press FCTN= to quit and follow the instructions above.

Fast-Term "fix" improves downloads

Joe Nuvolini, Sysop of the Villa...TI electronic bulletin board (303-574-2567) in Colorado Springs, Colorado, offers the following suggestions for users of Paul Charlton's Fast-Term:

From time to time people have had difficulty during disk access on certain BBS's during 300 baud XMODEM downloads with Fast-Term. I know the problem arises sometimes on my Techie board. Paul Charlton made a patch to correct the problem and I finally located a copy of it. The only problem I encountered in making the correction is that I found the bytes that needed changing in the same sector but

(See Page 51)

User Notes

(Continued from Page 50)

at a different address. Additionally, the original code was slightly different. In mine I had to change bytes 82 through 99. The original version is printed first, followed by my version.

Implementing this patch to Fast-Term V1.16 (and perhaps other versions if the problem is present) will allow users to download files longer than 40 records from BBS's. Edit the second program image file (UTIL2 for most users), sector No. 22 (21 if you start from 0), starting at byte 74.

Version 1

addr : should have : change to

74	C020	0221
76	CCCE	FF00
78	1303	9801
7A	0201	D0B3
7C	CFDA	1603
7E	10E1	0620
80	0221	D0B2
82	FF00	1003
84	9801	0201
86	D0B3	CFDA
88	16F8	10DC
8A	0202	0202

Version 2

addr : had : change to

82	C020	0221
84	CCD0	FF00
86	1303	9801
88	0201	D0B3
8A	CFDA	1603
8C	10E1	0620
8E	0221	D0B2
90	FF00	1003
92	9801	0201
94	DOB5	CFDA
96	16FB	10DC
98	0202	0202

Do not make these corrections to your original Fast-Term disk. Copy the UTIL2 file to a newly initialized disk and make the changes using your favorite sector editor. Copy the remaining Fast-Term file to this disk and try to download with it before copying the corrected file to your working copy of Fast-Term. I tried my modified version at both 300 and 1200 baud on a file that was 64 sectors long and it worked just fine.

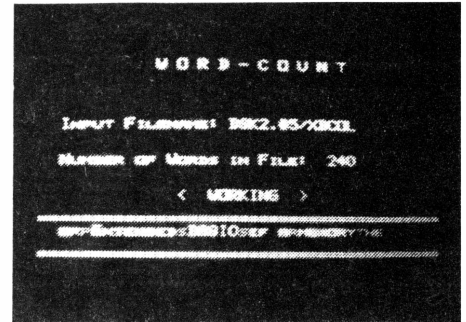
Wordcount II is very fast

Jim H. Jagielski, of Sanbornville, New Hampshire, has created a word counting program for use with TI-

Writer text files that operates at nearly blinding speeds. To prove it, the text scans across the screen as the words are counted. But it's just a blur. It counted a 33-sector file, containing some 1100 words, in seconds. The previous version of Wordcount would have taken

five minutes to perform the same task.

Jagielski's program is of his own design. He writes:



(See Page 52)

WORD-COUNT II

```

10 ! #####
15 ! * WORD-COUNT *
20 ! * BY JIM JAGIELSKI *
25 ! *
30 ! *NH99ERS USER GROUP*
31 ! *P.O. BOX 5991 *
32 ! *MANCHESTER,NH03108*
33 ! #####
35 GOTO 40 :: CALL INIT :: CALL LOAD:: CALL LINK
40 !BP-
45 CALL INIT
50 CALL LOAD(16376,83,84,65,82,84,32,36,244)
55 CALL LOAD(8194,43,80,63,248)
60 CALL LOAD(9460,2,224,131,0,6,160,37,48,6,160,37,74,6,160,37,200,6,160)
65 CALL LOAD(9482,37,222,6,160,38,234,6,160,39,154,6,160,39,236,6,160,38,162,4,192,2,1)
70 CALL LOAD(9504,128,0,4,32,32,32,5,128,2,128,3,192,22,250,4,91,2,0,240,0,216,0)
75 CALL LOAD(9526,131,212,2,0,1,240,4,32,32,48,2,0,7,241,4,32,32,48,4,91,2,0)
80 CALL LOAD(9548,0,131,2,1,42,92,2,2,0,19,4,32,32,36,2,0,0,215,2,1,42,112)
85 CALL LOAD(9570,2,2,0,11,4,32,32,36,2,0,1,119,2,1,42,124,4,32,32,36,2,0)
90 CALL LOAD(9592,1,158,2,1,42,136,2,2,0,13,4,32,32,36,2,0,1,236,2,1,42,150)
95 CALL LOAD(9614,2,2,0,17,4,32,32,36,2,0,2,17,2,1,42,168,2,2,0,23,4,32)
100 CALL LOAD(9636,32,36,2,0,2,62,2,1,42,192,2,2,0,13,4,32,32,36,2,0,3,80)
105 CALL LOAD(9658,2,1,42,206,2,2,0,25,4,32,32,36,4,91,4,192,216,0,131,116,4,32)
110 CALL LOAD(9680,32,28,192,32,131,124,32,32,41,176,22,249,4,91,6,160,37,28,2,0,0,131)
115 CALL LOAD(9702,2,1,42,92,2,2,0,19,4,32,32,36,2,0,1,66,2,1,42,232,2,2)
120 CALL LOAD(9724,0,16,4,32,32,36,2,0,1,186,2,1,42,250,2,2,0,25,4,32,32,36)
125 CALL LOAD(9746,2,0,2,128,2,1,157,0,4,32,32,32,5,128,2,128,2,168,22,250,2,0)
130 CALL LOAD(9768,2,248,4,32,32,32,5,128,2,128,3,32,22,250,4,96,37,12,2,0,0,4)
135 CALL LOAD(9790,2,1,41,178,2,2,41,170,193,8,4,195,60,241,10,131,2,35,48,0,220,131)
140 CALL LOAD(9812,6,0,22,248,10,132,2,36,48,0,220,132,2,1,32,0,212,129,2,0,48,0)
145 CALL LOAD(9834,2,3,41,170,144,19,22,2,220,193,16,252,144,83,19,1,16,2,6,3,212,192)
150 CALL LOAD(9856,2,0,41,170,2,1,96,0,188,1,2,128,41,176,22,252,2,0,1,210,2,1)
155 CALL LOAD(9878,41,170,2,2,0,6,4,32,32,36,4,91,2,0,3,83,2,1,43,62,2,2)
160 CALL LOAD(9900,0,17,4,32,32,36,4,192,216,0,131,116,4,32,32,28,192,32,131,124,32,32)
165 CALL LOAD(9922,41,176,22,249,2,1,89,0,208,32,131,117,144,64,19,134,2,1,78,0,208,32)
170 CALL LOAD(9944,131,117,144,64,22,237,3,0,0,2,224,131,224,4,32,0,0,2,0,1,82)
175 CALL LOAD(9966,2,2,13,0,2,3,32,0,2,4,1,97,2,5,8,0,4,198,216,6,131,116)
180 CALL LOAD(9988,2,1,126,0,2,7,0,128,4,32,32,32,4,32,32,28,209,160,131,124,33,131)
185 CALL LOAD(10010,19,17,6,7,22,246,2,1,128,0,2,7,0,128,4,32,32,32,4,32,32,28)
190 CALL LOAD(10032,209,160,131,124,33,131,19,3,6,7,22,246,16,227,2,1,128,0,4,32,32,32)
195 CALL LOAD(10054,208,96,131,117,144,129,19,16,145,65,22,5,2,128,1,82,19,214,6,0,16,212)

```

(See Page 52)

User Notes

(Continued from Page 51)

It's a machine language program that has been converted to CALL LOADs for the Extended BASIC enthusiast. It's a very fast program that will ignore control codes that are embedded in TI-Writer files saved using the SF option. My Wordcount program ignores these control codes so that they will not affect the total count. Also, a window is displayed which shows the line that is being worked on, but the program works so fast that you probably won't be able to read it anyway.

Entering the program is something of a chore, consisting as it does of little more than CALL LOAD statements. We proofed it twice to eliminate typing errors. While it is a time-consuming task, we think you'll find the program to be well worth the effort.

Operation of the program is simple. Simply RUN the program and you will be prompted for a filename (include the disk drive name, too). The program then races through the file, providing a readout on the number of words counted as it operates. When finished, it prompts you for additional files. If you are finished you simply respond with an "N" and it resets the computer to the title screen. The program requires Extended BASIC, expansion memory and a disk system.

Direct sound control demo

The program listing at right appeared in TINS in Nova Scotia and in the newsletter of the Winnipeg (Manitoba) 99/4 Users Group. Created by Tim MacEachern of Dartmouth, Nova Scotia, the program demonstrates the sound capabilities of the 99/4A. The program runs through a series of demonstrations involving attenuation, countdown rate and noise. The program requires Extended BASIC and a memory expansion. Although it's not the type of program

(See Page 53)

(Continued from Page 51)

```

200 CALL LOAD(10076,6,193,2,33,0,96,6,193,4,32,32,32,5,128,129,0,22,203,2,1,1,82)
205 CALL LOAD(10098,96,1,200,0,41,194,2,0,1,82,2,1,41,196,2,2,0,15,4,32,32,44)
210 CALL LOAD(10120,2,0,41,196,2,1,96,0,124,1,2,128,41,211,22,252,4,91,2,0,15,128)
215 CALL LOAD(10142,2,1,41,186,2,2,0,25,4,32,32,36,2,6,15,137,200,6,131,86,4,32)
220 CALL LOAD(10164,40,192,0,8,22,10,2,0,2,61,2,1,43,48,2,2,0,13,4,32,32,36)
225 CALL LOAD(10186,4,96,38,162,208,96,41,212,2,0,15,128,4,32,32,32,2,0,2,61,2,1)
230 CALL LOAD(10208,43,34,2,2,0,13,4,32,32,36,4,91,195,203,4,200,2,0,16,0,2,1)
235 CALL LOAD(10230,32,32,4,32,32,32,5,128,2,128,16,80,22,250,200,6,131,86,4,192,4,32)
240 CALL LOAD(10252,40,192,0,8,4,193,144,64,22,52,2,0,16,0,2,1,42,12,2,2,0,80)
245 CALL LOAD(10274,4,32,32,44,2,0,42,12,2,1,96,0,188,1,2,128,42,92,22,252,2,0)
250 CALL LOAD(10296,2,168,2,1,42,12,2,2,0,80,4,32,32,36,2,5,42,11,2,9,128,0)
255 CALL LOAD(10318,2,7,222,0,2,10,142,0,5,133,2,133,42,92,19,201,145,213,27,250,146,85)
260 CALL LOAD(10340,18,248,146,149,19,195,5,136,6,160,38,58,5,133,2,133,42,92,19,188,146,85)
265 CALL LOAD(10362,22,250,16,236,2,1,5,0,144,64,19,20,2,0,2,61,2,1,43,48,2,2)
270 CALL LOAD(10384,0,13,4,32,32,36,208,96,41,213,2,0,15,128,4,32,32,32,200,6,131,86)
275 CALL LOAD(10406,4,32,40,192,0,8,4,95,2,0,2,61,2,1,43,20,2,2,0,13,4,32)
280 CALL LOAD(10428,32,36,4,95,41,224,40,196,193,126,83,224,42,8,192,32,131,86,194,64,2,41)
285 CALL LOAD(10450,255,248,4,32,32,40,208,193,9,131,7,4,2,2,42,0,5,128,5,132,128,196)
290 CALL LOAD(10472,19,6,4,32,32,40,220,129,152,1,42,10,22,246,193,4,19,82,2,132,0,7)
295 CALL LOAD(10494,21,79,4,224,131,208,200,4,131,84,200,4,41,218,5,132,168,4,131,86,200,32)
300 CALL LOAD(10516,131,86,41,220,2,224,131,224,4,193,2,12,15,0,195,12,19,1,30,0,2,44)
305 CALL LOAD(10538,1,0,4,224,131,208,2,140,32,0,19,50,200,12,131,208,29,0,2,2,64,0)
310 CALL LOAD(10560,152,18,42,11,22,238,160,160,41,234,16,3,192,160,131,210,29,0,192,146,19,230)
315 CALL LOAD(10582,200,2,131,210,5,194,194,114,209,96,131,85,19,9,156,133,22,242,9,133,2,6)
320 CALL LOAD(10604,42,0,156,182,22,237,6,5,22,252,5,129,200,1,41,222,200,9,41,216,200,12)
325 CALL LOAD(10626,41,214,6,153,16,226,30,0,2,224,41,224,192,9,4,32,32,40,9,209,22,4)
330 CALL LOAD(10648,3,128,2,224,41,224,4,193,6,193,215,65,243,224,42,8,3,128,128,145,147,145)
335 CALL LOAD(10670,149,128,32,0,39,16,3,232,0,100,0,10,0,20,16,0,80,0,0,0,0,0)
340 CALL LOAD(10692,68,83,75,50,46,88,66,87,79,82,68,32,32,32,100,2,1,0,0,0,0)
345 CALL LOAD(10714,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0)
350 CALL LOAD(10736,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0)
355 CALL LOAD(10758,0,0,32,0,46,170,128,128,128,128,128,128,128,128,128,128,128,128,128,128,128)
360 CALL LOAD(10780,128,128,128,128,128,128,128,128,128,128,128,128,128,128,128,128,128,128,128,128)
365 CALL LOAD(10802,128,128,128,128,128,128,128,128,128,128,128,128,128,128,128,128,128,128,128,128)
370 CALL LOAD(10824,128,128,128,128,128,128,128,128,128,128,128,128,128,128,128,128,128,128,128,128)
375 CALL LOAD(10846,175,128,178,128,164,128,141,128,163,128,175,128,181,128,174,128,180,128,182,197,210,211)
380 CALL LOAD(10868,201,207,206,128,145,142,144,128,183,210,201,212,212,197,206,128,128,162,217,128,170,201)
385 CALL LOAD(10890,205,128,170,193,199,201,197,204,211,203,201,128,178,207,213,212,197,128,145,140,128,128)
390 CALL LOAD(10912,162,207,216,128,152,146,167,128,179,193,206,194,207,210,206,214,201,204,204,197,140,128)
395 CALL LOAD(10934,128,174,168,128,144,147,152,151,146,128,136,150,144,147,137,149,146,146,141,152,153,149)
400 CALL LOAD(10956,146,128,176,210,197,211,211,128,161,206,217,128,171,197,217,128,212,207,128,163,207,206)
405 CALL LOAD(10978,212,201,206,213,197,128,169,206,208,213,212,128,166,201,204,197,206,193,205,197,154,128)
410 CALL LOAD(11000,128,128,174,213,205,194,197,210,128,207,198,128,183,207,210,196,211,128,201,206,128,166)
415 CALL LOAD(11022,201,204,197,154,128,128,158,128,163,175,173,176,172,165,180,165,164,128,156,128,156,128)
420 CALL LOAD(11044,128,183,175,178,171,169,174,167,128,128,158,128,138,166,169,172,165,128,128,165,178,178)
425 CALL LOAD(11066,175,178,138,128,161,206,207,212,200,197,210,128,166,201,204,197,159,128,185,143,174,128)
430 CALL LOAD(11088,22,27)
435 CALL LINK("START")

```

User Notes

(Continued from Page 52)

you're going to run over and over, it may serve as a source of ideas for incorporating unique sounds into user-written programs.

Screen-text dump subprogram

Jiri Svoboda, of Toronto, Ontario, provides a versatile screen-text dump program. It requires Extended BASIC, two disk drives and an expansion memory.

The SCRTXTDUMP subprogram should be saved as listed with the SAVE command using the MERGE option. There is no need to rename the variables; a potential name conflict doesn't exist in this subprogram architecture.

To dump the screens of an Extended BASIC program to a printer, load a program, merge the SCRTXTDUMP subprogram into this program and place the CALL STD statements in all locations of the loaded program, in which you wish to dump the screen content.

When running the modified Extended BASIC program, selected screens (32 characters in width) will be dumped to the SCRTXTDATA TI-Writer compatible file in disk drive 2.

The SCRTXTDUMP subprogram offers the following options:

- Screen width SW=1 to 40 (limited by a maximum number of screen columns used—usually 32 or 40) may be changed on line 30030.

- Disk drive number DSKx for a storage of the dumped screen datafile may be changed in the OPEN statement on line 30035.

- In case, the screen dumps will not interfere with an outputting of the program data to a printer, an immediate screen dump mode may be set by deleting the exclamation mark on line 30040 and deleting all three lines with odd numbers.

The SCRTXTDATA file should be given a new specific name or it can be

(See Page 54)

```

100 ! DIRECT SOUND CONTROL
110 ! DEMO PROGRAM
120 ! BY Tim MacEachern
130 !
140 ! DARTMOUTH, NOVA SCOTIA
150 !
160 !
170 S=-31744 !ADDRESS OF SOUND CHIP >8400
180 V1=0 ! VOICE 1 FLAG
190 V2=32 ! VOICE 2 FLAG
200 V3=64 ! VOICE 3 FLAG
210 N=96 ! NOISE FLAG
220 C=128 ! COMMAND FLAG
230 F=0 ! FREQUENCY FLAG
240 A=16 ! ATTENUATION FLAG
250 WHITE=0 ! WHITE NOISE FLAG
260 PERIODC=4 ! PERIODIC NOISE FLAG
270 CALL INIT :: CALL CLEAR
280 ! DEMO--START VOICE ONE
290 PRINT "SET VOICE 1 IN THREE LOADS"
300 CALL LOAD(S,C+V1+A+0)! SET ATTENUATION TO 0
310 CALL LOAD(S,C+V1+F+0)! SET BOTTOM FOUR BITS OF COUNTDOWN RATE TO 0
320 CALL LOAD(S,33)! SET TOP 6 BITS OF COUNTDOWN RATE
330 GOSUB 820
340 PRINT : "SET VOICE 1 IN A SINGLE LOAD"
350 CALL LOAD(S,C+V1+A+6,0,C+V1+F+0,0,22)
360 GOSUB 820
370 PRINT : "ATTENUATION DEMO"
380 CALL LOAD(S,C+V1+A+6,0,C+V1+F+0,0,56)! START VOICE ONE AS A REFERENCE (VERY QUIET)
390 CALL LOAD(S,C+V2+A+15,0,C+V2+F+0,0,48)! TURN V2 OFF BUT PRESET TO ONE
400 FOR I=1 TO 5
410 FOR ATTEN=15 TO 0 STEP -1
420 CALL LOAD(S,C+V2+A+ATTEN)
430 FOR DELAY=1 TO 40 :: NEXT DELAY
440 NEXT ATTEN
450 NEXT I
460 GOSUB 820
470 PRINT : "COUNTDOWN RATE DEMO"
480 CALL LOAD(S,C+V1+A+1)! SET V1 ATTENUATION
490 FOR RATE=0 TO 1028 STEP 16
500 FOR BOTTOM4BITS=0 TO 15
510 CALL LOAD(S,C+V1+F+BOTTOM4BITS,0,RATE/16)
520 NEXT BOTTOM4BITS
530 NEXT RATE
540 GOSUB 820
550 PRINT : "CALCULATION OF RATE FOR MIDDLE C(FREQUENCY 261.63)"
560 FREQ=261.63
570 RATE=111860.8/FREQ
580 CALL LOAD(S,C+V1+A+0,0,C+V1+F+(RATE AND 15),0,RATE/16)
590 GOSUB 820
600 PRINT : "NOISE CONTROL OPTIONS"
610 PRINT : : "WHITE NOISE TYPE 0"
620 CALL LOAD(S,C+N+A+0,0,C+N+F+WHITE+0)
630 GOSUB 820
640 PRINT : "WHITE NOISE TYPE 1"
650 CALL LOAD(S,C+N+A+0,0,C+N+F+WHITE+1)
660 GOSUB 820
670 PRINT : "WHITE NOISE TYPE 2"
680 CALL LOAD(S,C+N+A+0,0,C+N+F+WHITE+2)
690 GOSUB 820
700 PRINT : "WHITE NOISE TYPE 3"
710 CALL LOAD(S,C+N+A+0,0,C+N+F+WHITE+3)
720 FOR DELAY=1 TO 500 :: NEXT DELAY
730 PRINT : : "CONTROL NOISE TYPE 3 THROUGH FREQUENCY OF VOICE"
740 FOR I=1 TO 10
750 RATE=RND23
760 CALL LOAD(S,C+V4+A+15,0,C+V3+F+(RATE AND 15),0,RATE/16,0,C+N+F+WHITE+3)
770 FOR DELAY=1 TO 300 :: NEXT DELAY
780 NEXT I
790 GOSUB 820
800 STOP
810 !TURN OFF ALL VOICES
820 FOR I=1 TO 500 :: NEXT I
830 PRINT : : "TURN OFF ALL VOICES"
840 CALL LOAD(S,C+V1+A+15)
850 CALL LOAD(S,C+V2+A+15)
860 CALL LOAD(S,C+V3+A+15)
870 CALL LOAD(S,C+N+A+15)
880 RETURN

```

User Notes

(Continued from Page 53)

directly incorporated into a Text Formatter file, e.g. into a program manual description. The special characters & and @ (if present on the dumped screens) must be doubled in the Text Formatter before outputting of the formatted datafile to a printer (unless a provision for these characters was made—see MICROpendium of September 1986, page 44).

At the end of a session with TI-Writer, the SCRTXTDATA file should be deleted. Otherwise, new screen dumps will be appended to this file.

```
30000 REM SCRTXTDUMP (MERGE)
30010 REM by Jiri Svoboda
30020 REM Toronto, Ontario
30030 SUB STD :: SW=32
30035 OPEN #9:"DSK2.SCRTXTDATA",APPEND
30040 ! OPEN #9:"PIO",OUTPUT
30050 BL$=RPT$(" ",(76-SW)/2)
:: CR$=CHR$(13):: X1$=BL$&RPT$("*",SW+4)&CR$ :: X2$=BL$&"*"&RPT$(" ",SW+2)&"*"&CR$
30055 PRINT #9:".CO SCRTXTDATA (Screen Text Data Dump)";
CR$:".SP 2";CR$:".NF";CR$
30060 PRINT #9:X1$:X2$ :: FOR R=1 TO 24 :: PRINT #9:BL$;
"* " :: FOR C=1 TO SW :: CALL GCHAR(R,C,K):: IF (K<32)+(K>126) THEN K=32
```

```
30070 PRINT #9:CHR$(K);:: NEXT C :: PRINT #9:"*";CR$ ::
NEXT R :: PRINT #9:X2$:X1$:CR$
30075 PRINT #9:RPT$(" ",35);
"Figure X.";CR$:".FI";CR$:".SP 2";CR$
30080 CLOSE #9 :: SUBEND
```

User Notes is a column of tips and ideas designed to help readers put their home computers to better use. The information provided here comes from many sources, including TI home computer user group newsletters. MICROpendium will pay \$10 for any item sent in by readers that appears in this column. Mail tips to: MICROpendium, P.O. Box 1343, Round Rock, TX 78680.

Classified

Software

E/A MODULE OWNERS

Our world famous "Bells, Bars, and Ratchets" is now available on diskette with speed critical routines written in assembly language. Enjoy our standard three-reel machine and our new four-reel machine—all in one complete package for \$12.95 plus \$1.50 for P&H. We use large, colorful figures and a beautifully engineered spinning motion—so realistic you will wonder where the coin slot is on your monitor. E/A module required. Gembar Graphics, 455 Amherst Circle East, Satellite Beach, Florida 32934. Florida Residents, please add 5%. Not just another slot machine program. **WARNING:** We are not responsible if you stay up all night playing this machine. v3,n10

BIRDSTRIKE

Jackson Software has introduced a new action game for the TI99/4A which makes the most of the computer's capabilities for color, graphics, animation, and music. **BIRDSTRIKE** is a different kind of game with many clever touches, stunning graphics, and a bit of humor. It requires Extended BASIC, and optionally utilizes joysticks

and speech synthesizer. Take off from the city airport and immediately encounter a flock of birds. If unsuccessful at maneuvering through the flock, the plane enters a spin and plummets to the ground. Try again and there's no telling what you'll encounter—traffic 'copters, biplanes, jet trainers. Price is \$15.00 for disk; \$8.00 for cassette. Jackson Software, P.O. Box 2171, Attleboro MA 02703. v3,n10

ARTIST COMPANION #3

In the continuing series of supplemental graphic packages for TI Artist (version 2.0x), Artist's Companion #3 keeps the spirit alive! Included in the two disk package are 16 new and original fonts, plus 66 small instances. The fonts are simply awesome, and the instances are incredible. Only \$9.95 (plus \$1.50 shipping). Call or write for additional information and printed samples. Texaments, 53 Center Street, Patchogue, NY 11772, (516) 475-3480. v3,n10

RAPID COPY

The only turbo copier specifically designed for the Myarc, CorComp and TI disk controller. Its longest copy time, with formatting, is 1 minute 17 seconds for a DS/DD 18 sector/track disk! Super fast, fully menu driven! Endorsed by Myarc for use with their disk controller card. Only \$14.95. Requires

32K and disk system. Add \$1.50 shipping. Texaments, 53 Center Street, Patchogue, NY 11772, (516) 475-3480. v3,n10

SPECIAL PRICES

(1.) USA STATES AND CAPITALS GAME, with the excellent map, state nicknames and abbreviations tutor; (2.) BIBLE BOOKS GAME, with 66 books and hundreds of clues; and (3.) YAKMAN (Requires Speech and TE II), an amazing speech facility; are now \$14.95 each (on tape). Any 2 for \$19.95! TRINITY SYSTEMS, 1022 Grandview, Pittsburgh, PA 15237. v3n10

TIGERCUB SOFTWARE

Over 130 original entertainment, education and programming utility programs in BASIC and X BASIC on cassette or disk, only \$3 each! 18 different full-disk collections just \$12 each! Descriptive catalog \$1 refundable. TIPS FROM TIGERCUB full-disk collections of 50+ programs and files from Tigercub Tips newsletters, Vol. I, II and III \$15 each, any two \$27, all three \$35, postpaid. NUTS & BOLTS (#1) and #2, full disks of 100+ utility subroutines in X BASIC Merge format, ready to merge into your own programs, \$19.95 each, both for \$37, with documentation, postpaid. 156 Collingwood Ave., Whitehall, OH 43213 v3n10

Classified

Software

MOVE OVER MAX

Here comes YAKMAN, a speech facility that's all mouth. YAKMAN speaks, he spells, he also contains preprogrammed speeches and sound effects. YAKMAN talks forwards, backwards, or in Pig Latin. With YAKMAN you can easily create, edit, and store up to 5 minutes of speech in memory or on tape. Say it now or say it later, say it in 64 different voices. AMAZING! On tape for \$14.95. A YAKMAN DEMO tape is available for \$5.95 (\$5.00 refundable). Requires Speech Synthesizer and Terminal Emulator II. TRINITY SYSTEMS, 1022 Grandview, Pittsburgh, PA 15237. v3n10

SUPERBUG II VERSION 2.0

SUPERBUG II Version 2.0 includes several new features and improvements. SUPERBUG II now allows Changing the List Device, Changing Screen Colors, Loading and Saving Program Files, String Searches, and GROM Base Change. The SUPER SPACE version is improved and the manual is increased to 52 pages. Send \$10.00 to Edgar Dohmann, Route 5 Box 84, Alvin, Texas 77511. v3n10

NEW MINI MEMORY \$19.95

PRK \$7.95, shipping \$2.95. SASE for list. TEX*IN TREASURES, 1122 English Court, Belle Plaine, KS 67013-0095. v3n10

Systems

FOR SALE

Super TI system with expansion box and original TI cards. CorComp DSDD card, Dual Teac half heights, spare console, spare power supply, lots of software and books. Call/write for details. John Jensen, 1571 Brandywine

Policy

Classified advertising is a unique feature of MICROpendium. The cost is 25 cents per word. Classified display (i.e., special formatting or graphics) is \$9 per column inch. Classified advertisements must be paid in advance. Classified advertisers may request a category under which they would like their advertisement to appear, but the final placement decision is the responsibility of the publisher.

Classified deadlines will be kept open for as long as practical. For the purpose of classified advertising deadlines, any classified ad received later than the first day of any month cannot be assured of placement in the next edition. We will do our best to include every advertisement that is submitted in the earliest possible edition.

The publisher offers no guarantee that any advertisement will be published in any particular issue. Any damages that result either from errors in copy or for failure to be included in any particular edition will be limited to the amount of the cost of the advertisement itself. The publisher reserves the right to reject any advertisement.

The advertiser may elect to publish the advertisement in subsequent editions at the same charge, payable prior to publication. The deadline for carryover classifieds is the same as for new advertising.

In submitting an ad, please indicate whether you would like a refund if it is not published in the requested edition or whether you would like us to hold it for the next edition. Cancellations and refunds cannot be made after the second day of the month.

Send classified advertising to: MICROpendium, P.O. Box 1343, Round Rock, TX 78680.

Road, San Mateo, CA 94402.
415-345-8061. v3n10

MAKE AN OFFER

Economic circumstances force sale. TI99/4A System. 2 keyboards, P-Box, 2sssd drives, 32k, Triple Tech, Speech, 13 inch Color, Epson. Much software. Details: Mike 619-483-1373 v3n10

TI 99/8

FOR SALE—AN ORIGINAL T.I. 99/8 Home Computer. ONE of only 250 consoles ever made, and it works perfectly. It has XBII, built-in speech, hexbus Interface, menu select speed control, graphics commands, and 64k memory. I also have the ENTIRE set of Hexbus peripherals, including the DS-DD drive/Controller Unit with half hi drive, the RS232 with Serial and parallel Ports, the Hexbus modem, the Printer/Plotter, the Printer80 dot matrix printer, and an Armadillo Interface card, for using the P-box. Also included is the original manual, and other data. Price is \$1600 firm.

R.A. Fleetwood, PO BOX 900921, Dallas, Tx 75390. Write for more detailed

info, or call the FLUG TIBBS @ (214) 321-4238. v3n10

Miscellaneous

NAVARONE DBMS \$37.95

SST Expanded BASIC Compiler \$29.95, Myarc RS232 card \$71.95, Mini Writer III \$39.95, Extended Software's Games Pack I, II, or III \$21.95 ea, Axiom Parallax \$59.95, Beginners BASIC Tutor \$4.00. Add \$2.00 per order shipping and handling. MC/Visa call 216-399-5463. Youngtree P.O. Box 197 Leavittsburg, OH 444310. Catalog sent with order or send \$2.00 (refunded with 1st order). v3n10

HELPPWARE

For TI-ARTIST PRINT OPTIONS.

A six page package of instructions and illustrations.

A time saving tool which permits accurate location of screen text to printed page. Very useful when using TI-ARTIST to enhance Banner Messages. For printed copies send \$1.50 and S.A.S.E. (4'x9 1/2 inches) to E.M. Smith, 3506 Garden Drive, Knoxville, TN 37918. v3

SUPER SOFTWARE AT SUPER SPECIAL PRICES

SUPER EXTENDED BASIC™ ... was \$99⁹⁵, now \$49⁹⁵
More than 100 extremely powerful TMS9900 assembly language subroutines which, in conjunction with XB & Memory Expansion, substantially expand the programming capabilities of the TI-99/4A. SUPER FAST SORT. Rated "A" in Feb. '85 MICROpendium. Disk. Add \$2⁹⁰ S&H.

VIDEO TITLES I™ was \$29⁹⁵, now \$19⁹⁵
Produce custom VCR titles without the aid of a camera. Three proportionally spaced character sets, automatic centering, variable spacing with automatic eye correction, 26 color combinations and multiple screen division with scrolling. Available on disk or tape. Add \$1⁰⁰ S&H.

VIDEO TITLES II™ was \$49⁹⁵, now \$34⁹⁵
XB VCR Titling Data Base Program — produces automated sequences of custom titles. Three PS character sets, choice of l/c/r justification, variable spacing with automatic eye correction, 4 frame styles, storage for 40 titles, 40 sprite patterns & 10 title sequences. Disk. Add \$1⁷⁵ S&H.

J & K H SOFTWARE @ 4911 S. 31ST STREET @ ARLINGTON, VA 22206 @ (703) 820-4131 @ VISA/MC ACCEPTED

The LEADING monthly devoted to the T199/4A

Subscription Fees

\$17 for 12 issues via domestic third class mail
\$20.50 for 12 issues via domestic first-class mail
\$20.50 (U.S. funds) for 12 issues Canadian or Mexican delivery
\$23.50 (U.S. funds) for 12 issues foreign delivery via surface mail
\$37.00 (U.S. funds) for 12 issues foreign delivery via air mail
(Texas residents add 87 cents sales tax)

Address Changes

Subscribers who move may have the delivery of their most recent issue(s) delayed unless MICROpendium is notified six weeks in advance of address changes. Please include your old address as it appears on your mailing label when making an address change.

Back Issue Policy

Back issues of MICROpendium are available to subscribers only. Those wishing back issues may notify us of the issue(s) desired and include \$1.50 per issue desired in a check or money order. (U.S. and Canada; Texas residents add 5.125% sales tax.) For foreign air-mail delivery, add \$2 per issue, 50 cents per issue surface mail. All prices listed are U.S. funds.

OUT OF STOCK: Vol 1, Nos. 1-2

Send me the next 12 issues of MICROpendium. I am enclosing \$ _____ in a check or money order in U.S. funds (Texas residents add 87 cents sales tax.) Mail to: MICROpendium, P.O. Box 1343, Round Rock, TX 78680

Name _____
Address _____
City _____
State _____ ZIP _____

v3,m10

The set of numbers on the right of your mailing label indicates the cover date of your last issue.

P.O. Box 1343, Round Rock, TX 78680

Postmaster: Address Correction Requested

**BULK RATE
U.S. POSTAGE PAID
ROUND ROCK, TX**

Permit No. 533